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THE *London Naturalist* and its supplement *The London Bird Report* are published annually, and provide a record of the activities of the members of the London Natural History Society and other London naturalists. Contributions are welcome from members of the Society on any natural history subject and, if space permits, from non-members on any aspect of the natural history of the London Area. The London Area, as defined by the Society, is comprised within a radius of 20 miles from St Paul's Cathedral, and includes the whole counties of London and Middlesex, together with parts of Bucks, Essex, Herts, Kent and Surrey. A map of this area is obtainable from the Society's Librarian, price 2d. All papers intended for publication in *The London Naturalist* and *The London Bird Report* should be submitted in the first instance to the Secretary of the appropriate Section, and not directly to the Editor. Other correspondence may be sent to the Editor at 39 South Grove House, Highgate, N.6.

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Swallow Holes and Springs in the Chalk of the Mole Valley.

By F. H. EDMUNDS, M.A., F.G.S.

THE River Mole has long been famed amongst the tributaries of the Thames for its habit of disappearing down numerous swallow holes in its bed, so that at times it is dry over parts of its course. Edmund Spenser, in the "Fairie Queene" (Book IV, Canto XI, Stanza 32) wrote—somewhat inaccurately, it must be confessed:—

" And Mole, that like a nousling mole doth make
His way still under ground, till Thames he overtake."

John Speed, in his famous map of Surrey published in 1610, shows a ridge of hills extending along the line of the Mole between Dorking (now Dorking) and Leatherhead (now Leatherhead), under which the river is depicted as disappearing as if into a tunnel at the Dorking end, to reappear at Leatherhead.

Although the Mole goes underground for part of its course, the origin of its name has no connection with the burrowing animal of the same name. According to the *Oxford Dictionary of English Place-Names*, it is a back formation from Molesey (=Mul's island), though it may, but perhaps less likely be derived from the Latin *mola* (a mill), and signify the "mill stream." The Mole formerly supported a considerable number of mills over its relatively short course, there being at least four in the neighbourhood of Dorking.

The swallow holes of the Mole, the positions of which are shown in Fig. 1, result partly from the geological structure of the district, and partly from a special topographical feature, produced by a slight uplift of the land relative to sea level of geologically recent date.

The strata involved are the following:—

- (1) Reading Beds—London Clay Impermeable clays which occupy the land surface north of Fetcham and Leatherhead, and overlie the next mentioned group.
- (1) Reading Beds—London Clay A group of highly permeable beds. The Chalk—about 800 ft. thick. Upper Greensand—about 40 ft. thick
- 3) Gault An impermeable clay beneath the Upper Greensand, which comes to the surface along a narrow strip of country through the northern part of Dorking.

These strata all slope (or "dip," to use the correct geological term) gently northward, as shown in Fig. 2.

In its course from Dorking northward the River Mole traverses these strata, from the Gault at Dorking to the London Clay northward of Fetcham. It will be apparent that, if the history of the river showed

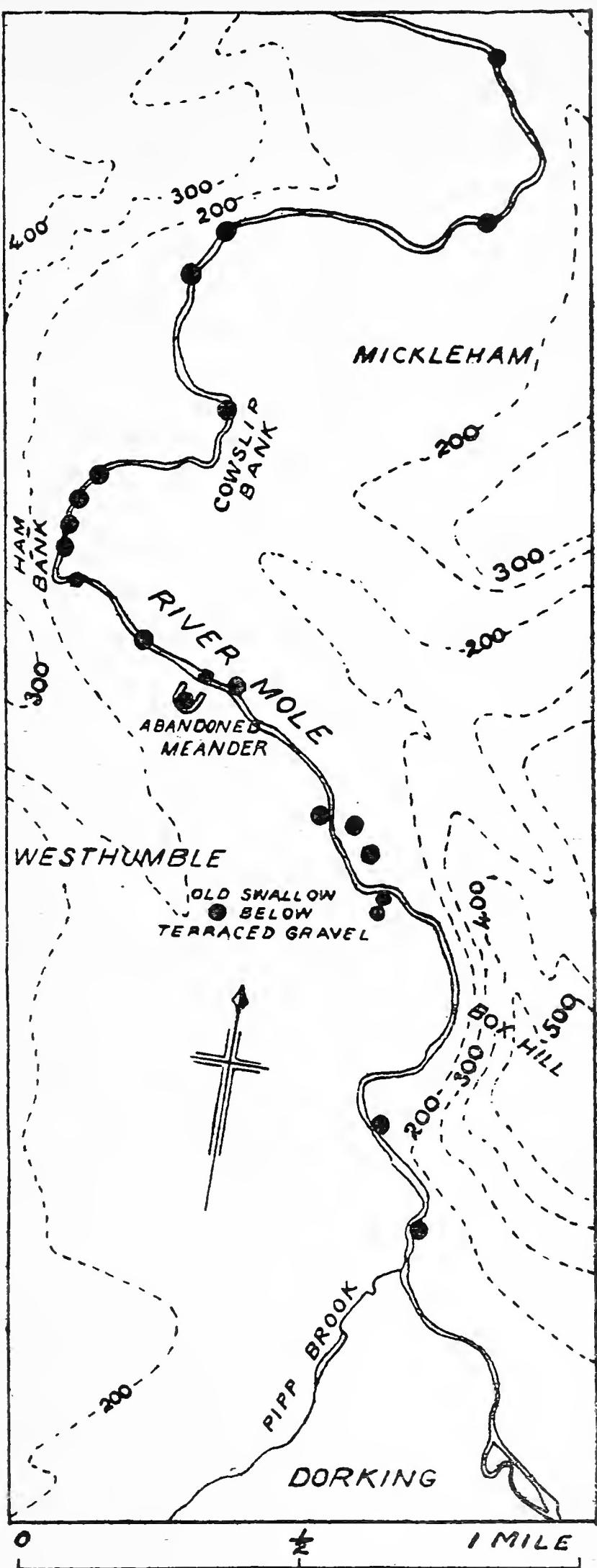


Fig. 1.—Map showing Swallow Holes along the River Mole.

a simple and straightforward process of river development, the river bed would have the form of a gentle uniform (logarithmic) curve, sloping gently northward. Further, the permeable strata, sandwiched between the Gault beneath and the Reading Beds above would be saturated with water to the level of the stream bed, since that would be the lowest level at which they would be exposed. Below that level no water could drain away; and it follows that, since the rocks below it would be saturated, no water could be absorbed; swallow holes, therefore, could not be formed.

Such may possibly have been the case at some period in the earlier history of the river, although a "fossil" swallow hole, so to speak, exposed in section at the southern end of the railway cutting at Box Hill railway station as a large sand-filled "pipe" in the Chalk, underlying gravel, points to the probability that even during its early history the Mole possessed swallow holes.

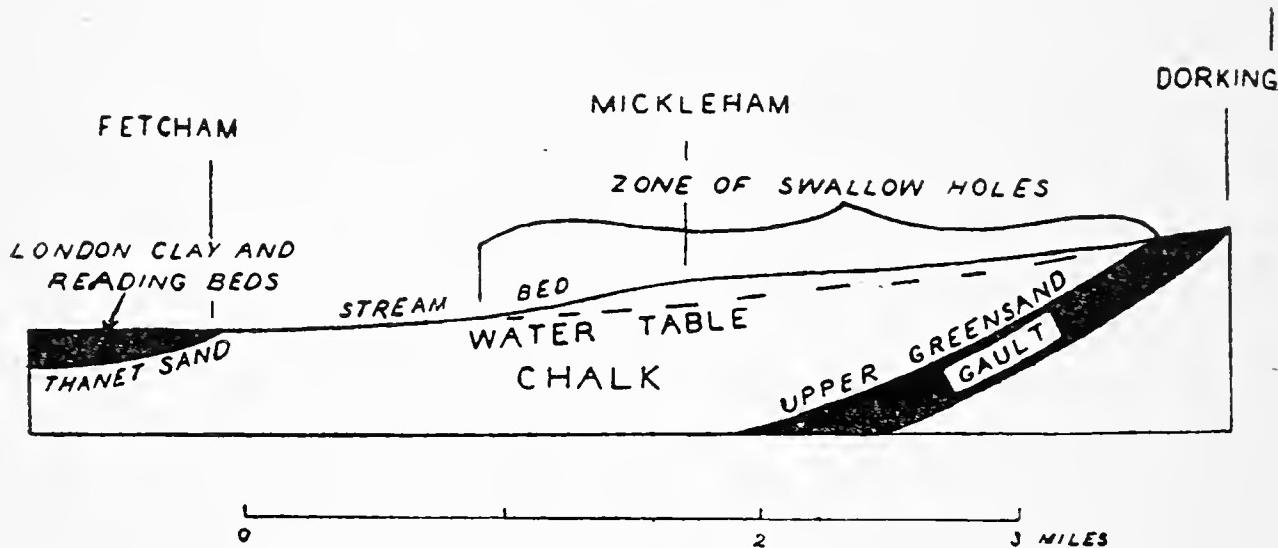


Fig. 2.—Diagram showing position of Water Table beneath the Bed of the River Mole.

After the Ice Age, the up-lift of the land relatively to sea level, referred to above, took place. This resulted first in the Thames, in its endeavour to accommodate its level to that of the sea, cutting a deeper valley than it formerly possessed. The effect of this Thames Valley deepening was to increase the relative height of the Mole valley above that of the Thames, and the Mole in its turn commenced to deepen its valley to accord with the new Thames level. This deepening process naturally commenced at the junction of the tributary with the Thames, and lowering of the Mole valley gradually progressed upstream. This process is still going on, and has now reached the neighbourhood of Mickleham.

As a consequence, the curve of the river bed between Dorking and Leatherhead is a double one (see Fig. 2); the effect of this may be seen in the much more rapid rate of flow in the river northward of Mickleham, compared with that upstream to the southward of the village, during periods when the river is flowing at the surface.

It has already been remarked that the Chalk, with the two minor formations associated with it, is highly permeable. The impermeable strata of the Gault below and the Reading Beds above may be regarded as the sides of a reservoir, containing the water within the Chalk. Along the line of the river this reservoir is full of water up to a line joining the lowest levels at which the Gault and Reading Beds respectively come to the surface at points in the bed of the Stream. This line lies on the top surface of the saturated zone, or water-table, in the Chalk. In a case of simple stream development the level represented by this line would coincide with the level of the stream bed, but from Fig. 2 it will be seen that owing to the composite nature of the curve of the bed, that part between Dorking and Mickleham is actually above the water-table. Hence, in this part of the stream, some few feet of the Chalk beneath the stream bed tends to remain unsaturated. Consequently the river water which flows in from the Weald, on reaching this area, sinks down any fissures which may occur in the Chalk until it reaches the water table, and then continues its journey northward underground. On its way it opens up the fissures by solution.

Further reference to Fig. 2 will show that northward from Mickleham the stream bed coincides with the water table, so that the stream again flows at the surface. At Leatherhead the stream flows at its full volume, although it may be dry south of Mickleham.

It will be obvious that when the inflow of water from the Weald is greater than can be accommodated by the fissures leading water underground, the excess water flows over the surface, and after heavy rain the river may actually flood.

The hydrological conditions encountered along the Mole extend laterally for a considerable distance. For example, measurement of water levels in wells around Mickleham and Westhumble shows a very low water table in the Chalk over a mile from the river. Absorption of rainfall over these areas is high, and it may be that water travels easily and rapidly northward through fissures to issue as springs at Thorncroft south of Leatherhead, on the right bank of the Mole and in the well-known mill-pond at Fetcham, which is mentioned in Domesday Book, on the left bank.

Generally speaking, if the water table in the Chalk on either side of the Mole were higher than the river—a condition common in permeable rocks along valley sides—water would rise as springs in the stream bed. This condition is the antithesis of that which produces swallow holes, and, whatever the reason, it is not present along the Mole Valley. Certain it is that water travels through fissures some of which must be very large, and into which overlying material sometimes collapses. The latest collapse occurred in February 1940 a few hundred yards E.N.E. of Mickleham Church. A fully-grown oak tree disappeared into a hole about 10 yards in diameter within a few minutes. The day afterwards the topmost twigs were visible in the hole about 15 ft. below the ground surface. Among other collapses, one, almost adjacent to the above, of unknown date, must have been enormous, as is evidenced by

the extent and depth of the present day depression at its site, which measures nearly 200 ft. across.

The springs in the Fetcham mill-pond possess characteristics unique in the south-east of England at least. They rise from the Chalk through some eighteen to twenty feet of gravel capped by a few feet of mud. They must have been in existence before the deposition of the gravel; that is, at a time when the River Mole flowed at rather a higher level than it does to-day. They rose up through the stream bed of that time, and have maintained throughout their life a free outlet. Their chief point of interest is their formation of crater-like vents, or "spring pits," the largest being some 16 ft. deep and 10 ft. across at the top. It should be noted that these spring pits were in existence before the mill-pond was constructed, and their depth has been only slightly increased by the silt which has accumulated in the pond. The disposition

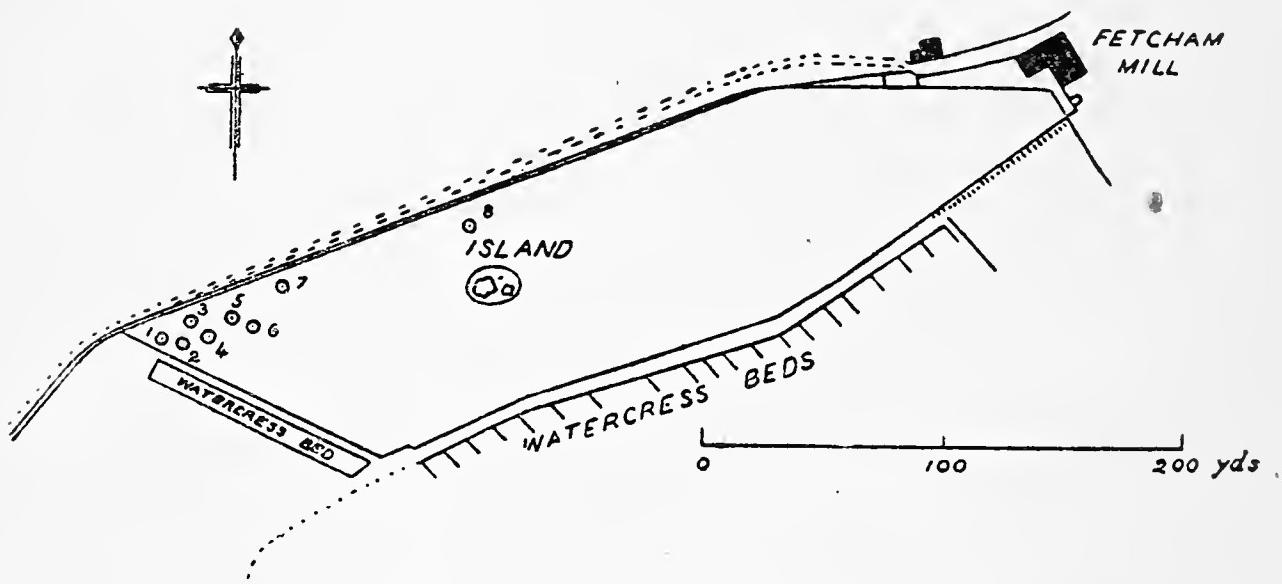


Fig. 3.—Plan of Fetcham Mill Pond, showing positions of Spring Pits.

of these pits is shown in Fig. 3. These springs maintain the mill-pond and supply the adjacent water-cress beds. Unfortunately, the pond at the present time (March 1944) is dry, and indeed has been dry for the longest period known, but when it is full the spring pits are, on a quiet bright summer's day, most fascinating to watch. Their contained water assumes the beautiful pale blue colour characteristic of clear deep chalk water, and at the bottom of each pit the inflow maintains sand perpetually in motion, and conjures up a picture of a miniature smoking volcano. These effects cannot be well seen if the water surface is rippled by wind to any great extent. Recently some pumping tests at the springs have shown that each spring pit seems to be fed from its own separate fissure; heavy pumping from one, while lowering its water level, has apparently affected neither the flow from, nor the water-level in, its neighbours, even though they are only a few feet away.

A further interesting point is that the gravel bed through which these springs rise does not appear to be saturated, and each spring

seems to have rendered the walls of its pit impermeable, apparently by an infilling of silt and clay.

The foregoing account, part of which is based on that given in "The Geology of the Country Around Reigate and Dorking," by H. G. Dines and F. H. Edmunds, *Mem. Geol. Surv.*, 1933, is contributed by permission of the Director of the Geological Survey. Thanks are due to Mr E. O. Mizen, and to Messrs Duke and Ockenden Ltd., for information on the Fetcham spring pits.

Display Flights by Linnets.

By K. E. Hoy.

The Handbook of British Birds does not record any type of display flight for the Linnet (*Carduelis cannabina cannabina* (L.)), so the following observations made in the Epping Forest area are of interest.

March 30, 1941: watched a bird descending from a fair height (at least 100 ft.) at a great speed with emphasised undulation, braking and checking itself and then plunging again; singing "madly" all the time.

April 13, 1941: after flying up to a peak, with a fluttering flight, a bird descended with wings held rigid—somewhat like a tree-pipit before alighting—for about 60 ft. (not a very sharp angle), and then alighted on the top of a bush, beneath which a female was feeding. The flying bird was twittering very slightly "under its breath" differently from the normal flight notes.

June 27, 1941: a bird flew round, almost completing a circle, with slow beating, drooping wings, singing (rather like the display flight of the greenfinch).

March 28, 1943: a male bird flew the 20-30 ft. between the tops of two oak-trees, with wings set—planing; the tail was expanded. While in the air it was continually uttering a note like "scree, scree, scree"; when it had alighted it commenced singing. Two birds were in the top of the tree from which it started its flight.

Plant Gall Records for 1943.

Compiled by H. J. BURKILL, M.A., F.R.G.S.

AGAIN conditions curtailed activities and observations could only be carried on irregularly. The Sectional Committee visited Croham Hurst and Selsdon Wood, while Members when out with other Sections elsewhere noted various species.

It is hoped the following notes cover the more interesting items.

Cynipidae. It seems as if the scanty rainfall of the spring may have rendered the oaks in many localities unsuitable for gall development as various spring forms were not always followed by their alternate forms later on.

Sleeving of *Andricus radicis* Fabr. resulted in galls of *A. trilineatus* Htg. at Wallington by Mr Niblett, and also at Fetcham. Mr Niblett was successful in finding *Diplolepis verrucosa* Schl. in two localities and was able to breed out the flies. He also got *Rhodites mayri* Schl. in two places in Surrey, a fresh county for the insect, *Aulacidea pilosellae* Kieff., *A. hieracii* Bouche, *A. tragopogonis* Thoms. and *Phanacis centaureae* Foerster, and Cynipid galls on *Tragopogon* similar to those found near Headley in 1933 on the leaves. It is hoped that he will be able to breed out the flies for identification.

Diplolepis agama Htg. was seen plentifully on one tree near Cobham while *D. disticha* Htg. and *Andricus glandulae* Schenck were taken at Selsdon. On *Centaurea scabiosa* L. galls of *Isocolus scabiosae* Gir. and *I. rogenhoferi* Wachtl. were in greater numbers than for some years past.

Cecidomyiidae. *Diplotaxis muralis* DC. flower buds galled by midge larvae were again found at Fetcham. *Veronica scutellata* L. and the var. *villosa* Schum. were both found at Bookham galled by *Perrisia similis* F. Lw. *Senecio aquaticus* Hill galled in some cases by red larvae and in others by yellow which latter seem to correspond to Houard No. 5864. *Achillea ptarmica* L. flower-heads distorted by yellow larvae, possibly *Rhopalomyia palearum* Kieff. Umbellifer galls were remarkably scarce and seldom seen, only a few *Lasioptera carophila* F. Lw. being noted.

Muscidae. *Euribia* species were plentiful. *E. stylata* Fabr., *A. cardui* L., and *E. jaceana* being more abundant than for many years. *Melanagromyza simplicoides* Hendel was also having a good season though some of the galls had been torn open, presumably by Blue Tits. *Chlorops cingulata* Meig. was seen in five places on *Brachypodium sylvaticum* R. & S., but *Poomyia hellwigi* Rubs. on the same host plant was only found once though looked for frequently.

Aphididae. These were generally below the previous year's numbers and the various species on Poplars were much fewer than in 1942. *Brevicoryne brassicae* L. was found attacking *Barbarea vulgaris* Br. at the side of the River Mole at Leatherhead, a host plant new to our records.

Acar. *Tarsonemus spirifex* Marchal on *Agropyron repens* Beauvois at Fetcham.

Eriophyidae. A big bush of *Lonicera periclymenum* L. on Banks Common was found to be very heavily galled by *Eriophyes xylostei* Can. I had visited the plant in other years without detecting the characteristic malformation of the leaves so was considerably surprised to see how the mites were swarming there. A few galled leaves were seen on the adjoining Bookham Common where we had noted the gall several years ago. We have not seen it elsewhere in the district.

Galium palustre L., margins of leaves rolled by *E. galii* Karp. *G. uliginosum* L., buds aborted and enlarged by *Eriophyes* sp. *Achillea ptarmica* L.: (1) Flower heads distorted and swollen by containing *Eriophyes* sp. (2) Buds swollen containing two species of *Eriophyes*. (3) Margins of leaves rolled by *Eriophyes* sp. *Solanum dulcamara* L., one plant very heavily attacked by *E. cladophthirus* Nal. on the south side of Box Hill, and also found in two places to the north of Leatherhead. I have no record of it being noted in the district before. *Populus tremula* L. near Cobham and near Little Bookham young trees heavily galled by *E. dispar* Nal. *Pinus sylvestris* L. on Ockham Common with leaves deformed, stunted, discoloured, toothed along the margins, and massed together. Microscopical examination disclosed a number of *Eriophyes* sp.

Nematoda. *Betula alba* L. Aborted buds four feet up the trunk were found to be inhabited by Eelworms. In 1938 a root of *Agrostis tenuis* Sibth. attacked by *Anguillulina graminophila* Goodey was planted in my garden for observation. Galls appeared in 1943 on a plant four feet away thus showing a rate of dispersal of these worms through the soil.

Entomology Notes for 1943.

By H. J. BURKILL, M.A., F.R.G.S.

AGAIN it was not considered expedient to ask for detailed reports from members but notes and observations reached me at times and the substance of these has served for the basis of this article.

Pararge megera L. was once more the most often noted species, being abundant nearly everywhere, and *P. egeria* L. was also in excess of normal. An early spring helped many species into prominence and some continued on until late autumn, *Aglais urticae* L. apparently producing a third generation emerging in November. *Eumenis semele* L. and *Maniola tithonus* L. were both above normal numbers.

Mrs Rait Kerr reported a specimen of *Argynnis lathonia* L. seen in her garden close to Lords Cricket Ground. *Vanessa cardui* L. was seen frequently, while *Polygonia c-album* L. flourished in its old haunts and seems to be still extending. *Limenitis camilla* L. was reported to be plentiful in places, especially in Essex. *Colias croceus* Fourcroy was seen at Bookham several times and elsewhere in our area. A number

of larvae of *Gonepteryx rhamni* L. bred up produced a proportion of one male to three females, a result reversing the usual ratio of the sexes when bred in other years. *Lycaenopsis argiolus* L. was scarce. Among the Skippers *Erynnis tages* L. and *Syrichthus malvae* L. were plentiful, while *Ochloides venata* Bremer & Grey swarmed at Bookham and elsewhere.

One larva of *Endromis versicolor* L. was found feeding on *Quercus robur* L. at Bookham.

Apart from Lepidoptera little information has come through, but a few members have been able to collect records for future use. One feature of Bookham Common was the scarcity of blood-sucking flies during the summer, only one species, *Tabanus maculicornis* Zet., and two Clegs, *Haematopa crassicornis* Whlbg. and *H. pluvialis* L., being met with. In other years Tabanids have made existence by the ponds anything but pleasant.

"Cuckoo spit" which was very abundant in 1942 on Bookham Common was not so noticeable in 1943, but on 2nd May quantities were noted on *Salix caprea* L. on Leatherhead Common.

Colonies of the white Aphid, *Forda formicaria* Heyden were found at the roots of Turnips and Brussels sprouts at Fetcham.

Diptera at Byfleet, Surrey.

By L. PARMENTER, F.R.E.S.

THE towpath along the Wey Canal at Byfleet with its varied vegetation and marshy and sandy areas has always been popular with London naturalists. With other members of the Entomological Section I visited the locality on 14th July 1935, 22nd May 1938, and 9th July 1939. From each visit I returned with many specimens but obviously I only sampled the variety present.

The following list of those so far identified in my collection indicates the year of capture by the final figure for the year.

MYCETOPHILIDAE.

Apemon marginata Mg., 8.

TIPULIDAE.

Nephrotoma crocata L., 8. *N. flarescens* L., 9. *N. flaripalpis* Mg., 9. *N. maculata* Mg., 8. *Tipula fascipennis* Mg., 9. *T. variipennis* Mg., 8.

PTYCHOPTERIDAE.

Ptychoptera albimana F., 8. *P. contaminata* L., 9.

BIBIONIDAE.

Bibio leucopterus Mg., 8. *B. reticulatus* Lw., 8. *Dilophus febilis* L., 8.

STRATIOMYIDAE.

Beris clavipes L., 8. *B. Morrisii* Dale, 9. *Chloromyia formosa* Scop., 5
Microchrysa polita L., 8.

TABANIDAE.

Chrysops caecutiens L., 5. *Tabanus bromius* L., 9.

LEPTIDAE.

Chrysopilus aureus Mg., 9. *C. cristatus* Verr., 9. *Leptis lineola* F., 5.

ASILIDAE.

Dioctria atricapilla Mg., 9. *D. baumhaueri* Mg., 9. *D. rufipes* Deg., 8.
Dysmachus trigonus Mg., June 1938 (K. M. Guichard). *Epitriptus cingulatus* F., August 1940 (H. J. Burkill). *Leptogaster guttiventris* Zett., 5.

EMPIDIDAE.

Empis tessellata F., 8. *Ocydromyia glabricula* Fln., 9.

DOLICHOPODIDAE.

Argyra diaphana F., 8. *Dolichopus atratus* Mg., 9. *D. discifer* Stann., 9. *D. signatus* Mg., 9. *D. ungulatus* L., 5. *Gymnopternus aerosus* Fln., 9. *G. cupreus* Fln., 8. *Hercostomus nigripennis* Fln., 9. *Hypophyllus obscurellus* Fln., 9. *Psilopus platypterus* F., 9.

LONCHOPTERIDAE.

Lonchoptera lutea Pz., 8.

PIPUNCULIDAE.

Pipunculus zonatus Zett., det. J. E. Collin, 9. *Verrallia pilosa* Zett., det. J. E. Collin, 9.

SYRPHIDAE.

Chilosia bergenstammi Beck., 8. *C. honesta* Rond., 8. *C. scutellata* Fln., 9. *Chrysogaster hirtella* Lw., 8. *Chrysochlamys cuprea* Scop., 8. *Chrysotoxum bicinctum* L., 9. *C. festivum* L., 5, 9. *Criorrhina berberina* F., 8. *Didea fasciata* Macq., 8. *Eristalis arbustorum* L., 5. *E. nemorum* L., 5. *E. pertinax* Scop., 5, 8, 9. *E. tenax* L., 8, 9. *Eumerus tuberculatus* Rond., 8. *Helophilus pendulus* L., 8, 9. *H. transfugus* L., 9. *H. versicolor* F., 5. *Leucozona lucorum* L., 8. *Melanostoma mellinum* L., 5. *M. scalare* F., 5, 8. *Merodon equestris* F. var. *equestris*, 8, var. *narcissi* F., June 1939 (K. M. Guichard). *Pipiza noctiluca* L., 8. *Pipizella virens* F., 9. *Platychirus albimanus* F., 8. *P. angustatus* Ztt., 5. *P. clypeatus* Mg., 5. *P. scutatus* Mg., 5. *Sericomyia borealis* Fln., 9. *S. lappona* L., 8. *Sphaerophoria menthastris* L., 5. *S. scripta* L., 5. *Syritta pipiens* L., 5, 8. *Syrphus albostriatus* Fln., 8. *S. auricollis* Mg., 5, 8. *S. balteatus* Deg., 5. *S. bifasciatus* F., 8. *S. corollae* F., 5, 9. *S. luniger* Mg., 5, 9. *S. punctulatus* Verr., 8. *S. ribesii* L., 5, 8. *S. torvus* O.S., 5. *S. venustus* Mg., 8. *S. vitripennis* Mg., 5. *Volucella pellucens* L., 5. *Xanthogramma ornatum* Mg., 8. *Xylota abiens* Wied., 9. *X. nemorum* F., 5. *X. segnis* L., 8.

CONOPIDAE.

Conops vesicularis L., 8. *Sicus ferrugineus* L., 9.

TACHINIDAE.

Echinomyia ferox Pz., 9. *Ernestia rufa* Fln., 8. *Lucilia illustris* Mg., 9. *Metopia leucocephala* Rossi, 9. *Onesia aculeata* Pand., 8. *Phorocera assimilis* Fln., 8. *Sarcophaga carnaria* L., 8. *Thelaira nigripes* F., 9.

ANTHOMYIDAE.

Anthomyia pluvialis L., 5. *Fannia hamata* Macq., 8.

CORDYLURIDAE.

Scatophaga maculipes Zett., 8.

SCIOMYZIDAE.

Phaeomyia fuscipennis Mg., 9. *Sepedon spinipes* Scop., 8. *Tetanocera elata* F., 5, 8.

SAPROMYZIDAE.

Minettia fasciata Fln., 5. *M. lupulina* F., 5. *Sapromyza pallidiventris* Fln., 8. *Tricholauxania praeusta* Fln., 8, 9.

PSILIDAE.

Lissa loxocerina Fln., 9.

OPOMYZIDAE.

Balioptera tripunctata Fln., 8. *Opomyza germinationis* L., 5, 9.

HELOMYZIDAE.

Helomyza notata Mg., 9.

OCHTHIPHILIDAE.

Ochthiphila polystigma Mg., 9.

EPHYDRIDAE.

Hydrellia incana Stenb., 8.

BORBORIDAE.

Leptocera silvatica Mg., 8.

Observations on the Parasites of the Cabbage Butterflies.*

By JOHN H. HARVEY.

A GREAT invasion of Cabbage White Butterflies at the end of August 1942 took place in the neighbourhood of Prestatyn in the county of Flint, North Wales. Many hundreds, in fact thousands of the butterflies, belonging to the species *Pieris brassicae* L. (Large White) and *P. rapae* L. (Small White), but principally to the former, flew over and around the fields and gardens for some days, and then disappeared, probably carried on by the wind.

Unfortunately for the gardeners of the district, they left behind them quantities of eggs laid upon the leaves of cabbages and other brassicae, which soon hatched out a voracious swarm of caterpillars. When young, before the first moult, their ranks are thinned by birds, but in its later stages the larva of the Large White in particular seems to be distasteful, partly because of its hairiness, but more probably on account of a disagreeable taste corresponding to its smell. This was borne out by the occurrence of full-grown larvae with noticeable scars such as could only have been made by birds' beaks; the bird discovered in time that it had made a mistake, and the larva recovered and continued its depredations. One larva had a large double scar across its back between the eighth and twelfth segments, which had caused a contraction resulting in the tail claspers being normally raised in the air. In spite of this marked disability the larva was able to climb many feet up the house wall and on the glass surface of a window, making a distinct effort every time it was necessary to use the claspers for a series of "steps" with the anterior pro-legs. Its progress was of course far slower than that of a normal larva. It was able to pupate, but the chrysalis showed a marked scar.

The capacity to climb depends entirely upon the silk supply, the head moving constantly from side to side laying a "corduroy road" in advance of the legs; the six true legs behind the head have practically no power of gripping the wall surface, so that if the pro-legs once lose their grip on the silken road, the caterpillar falls and has to start again. In climbing the wall of the house seven suitable regions for pupation were met with in succession: the undersides of the window-sills, of the transoms across the middle of the windows, and the heads of the windows of ground and first floors, and the boarded eaves. All of these were chosen by different larvae, and none was especially preferred—distance seems to be no object, and some are prepared for a laborious climb of nearly twenty feet while others make do with only three, and are just as well suited. It might be thought that those larvae which are

*Brief reference to the subject matter of the present paper was made in *The London Naturalist* for 1942, p. 26.

burdened with a load of internal parasites (the larvae of *Apanteles glomeratus* L.), would be the sluggish ones content with a lower level, but this is not the case, as a large proportion of emergences of *Apanteles* occurs beneath the eaves.

The fact seems to be that until the caterpillar has selected its spot for pupation, it suffers little or no inconvenience from the parasites; larvae squashed on the ground when about to begin their climb are full of blood, though swarming with perhaps two dozen or more ichneumon larvae. But once the larva has stopped feeding, the parasites in its system gradually drain its blood, and continue to do so when it has found its quiet spot, until the caterpillar is only a bag of skin, when the parasites emerge to spin their own cocoons and pupate on their own account. As if at a given signal, the many parasites make their way out of their host's body simultaneously, or nearly so, each making a hole in the caterpillar's back, sides, or belly, though where they are numerous the later individuals may follow the first to emerge through an existing hole. As soon as the parasites are free, they move towards the surface, horizontal or vertical, on which the caterpillar was resting, grouping themselves beside and behind the body of the caterpillar. This seems to have given rise to the impression that the parasites all emerge from one hole in the caterpillar's belly, which was at any rate not the method adopted in this instance.

So far, the unfolding story is one well-known to all possessors of a cabbage patch, who cannot miss either the caterpillars or the conspicuous groups of the small yellow cocoons of the parasite, their principal ally in the defence of their kitchen supplies. The present writer's attention was however drawn to several less obvious complications by the behaviour of some small flies which were seen sitting beside, or even upon, caterpillars which had spun their tail-pad and silk girdle, and were awaiting transformation. These larvae were of course those not affected by the common parasite *Apanteles*, and included in the first place several specimens of the Small White caterpillar.

In one case the larva had hung itself up beneath the transom of the window, so that it could easily be observed from within, and on the 28th of September two small flies were seen sitting upside down beneath the transom, close to the caterpillar, which had been awaiting its transformation for two or three days. Pupation took place on the night of the 28th, and on the following morning I was surprised to see the two flies slowly walking over the new chrysalis. On further examination with a glass it appeared that the flies were laying their eggs in the pupa, whose soft immature state evidently rendered the process easy.

Examination of other Small White caterpillars disclosed two more cases of waiting flies, one of them seated quietly on the back of the caterpillar, which jerked itself irritably from time to time, without unseating its intending persecutor. Specimens of these flies were identified by Mr G. E. J. Nixon of the Imperial Institute of Entomology as *Pteromalus puparum* Linn., a Chalcid hymenopteron. During this search a different species of small fly was seen, moving over the surface of the wall and exploring with serpentine coilings of its long antennae,

which wavered about continually and writhed over the undulations of roughcast and other inequalities. These flies were identified by Mr Nixon as *Hemiteles fulvipes* Grav., an Ichneumonid.

The two *Pteromalus* on the first Small White pupa continued busily laying eggs for over 24 hours, but considerable intervals took place between successive ovipositions in some cases. The insertion of the ovipositor was sometimes the work of only a few minutes, sometimes of a quarter to half an hour. The total number of eggs laid must have been considerable, perhaps some two dozen from each fly, although they seemed to suspend operations at dusk and sit quietly on the pupa until morning. On the morning of the 30th September I removed one of the flies as a specimen, but the other continued laying eggs during the day, while on the 1st of October it took up its station a few inches away beside a Large White caterpillar about to transform beneath the same window bar.

Meanwhile, the Small White beneath the window-sill, on which a fly had been sitting, had transformed, and the fly was ovipositing repeatedly. I also found further specimens of *Pteromalus* waiting beside Large White as well as Small White caterpillars, and they do in fact "patronise" both species, though at first it seemed that they showed a marked partiality for the Small White. Further specimens of *Hemiteles* had appeared by this time, and were prospecting the little yellow cocoons of *Apanteles glomeratus*; my suspicions were soon confirmed by seeing them oviposit in these cocoons, or rather in the pupae within, so far as could be seen. *Hemiteles* is in fact a hyperparasite, parasitic upon the parasites of the caterpillar, and the latter's avenger and enemy to the gardener.

The surviving *Pteromalus* of my original couple was now sitting upon the Large White caterpillar about to transform, but after doing so for a day and a night without the transformation having taken place, it attempted to oviposit through the skin of the larva. After immense exertions, continued for more than half an hour, it was unable to penetrate the skin and admitted defeat, resuming its waiting posture. During its struggle it was possible through a small glass to see the minute bristle-like ovipositor actually bending under the strain, though the fly has only the grip of its minute claws to give adhesion.

The caterpillar's pupation took place in the night, and the indefatigable fly, later joined by a second, spent another 24 hours and more carrying out its repeated laying. The Large White pupa was evidently a tougher proposition than that of the Small White, and penetration took longer. In one observed instance it seemed that the initial penetration was utilised for laying several eggs, as the ovipositor was from time to time partially withdrawn and then re-inserted, each insertion causing the pupa to jerk violently from side to side as far as its silk girdle permitted. This strongly suggested that it felt and resented the repeated pricks which would be caused by such serial egg-laying.

Both in this case and in its original attacks upon the Small White pupa, the *Pteromalus* was observed, but only on certain occasions, to scrape with its mandibles at the skin of the pupa for several minutes.

This may possibly have had the purpose of assisting penetration in a difficult spot, but it was not possible to form any certain conclusion. The easiest part of the pupa for penetration appeared to be upon the wings of the future butterfly, and the majority of observed layings took place within that area. Lest it should be thought that any of the fly's behaviour suggested rudimentary intelligence, another point must be added, which supports the multitude of instances of instinctive "stupidity" adduced by Fabre: two specimens of *Pteromalus* patiently sat for more than 24 hours on the bodies of Large White caterpillars from which *Apanteles* larvae had already emerged, and which would therefore never provide a host pupa for the *Pteromalus*.

The normal process of egg-laying by *Pteromalus* is as follows: the fly moves slowly over the surface of the pupa, with its rather short hinged antennae waving gently like semaphores over the pupa. Sometimes it hesitates above a particular spot, and then goes on; eventually it stops, and the antennae play over a given point for a short time. It then raises itself upon its four front legs and straddles the rear pair, bringing the point of the abdomen forward until it is bent under at a right angle to the thorax, and is roughly in line with the middle pair of legs. The correct spot may be found at once, or only after some hesitation, but soon the point of the ovipositor rests on the surface of the pupa, and the rear part of the abdomen moves upwards and backwards. The ovipositor is now seen to be hinged rather more than half-way forward on the underside of the belly, evidently lying in a sheath or channel when not in use. The abdomen at the base of the ovipositor now pulsates and bulges, and if all goes well, the ovipositor gradually sinks into the pupa, until its base touches the skin, while the point of the abdomen sticks up, forming an angle, as though the underside of the belly had become pyramidal. During insertion the antennae wave slightly; now with head down they come to rest a little above the surface. The ovipositor may be partly withdrawn and then reinserted, but this is perhaps not normally the case. After a short time, except where several withdrawals and insertions take place, the ovipositor is withdrawn, and the process repeated elsewhere.

We must now return to the hyperparasitic *Hemiteles*. Unlike *Pteromalus*, which is broadly built, these are thin and rather wasp- or ant-like, with the ovipositor a visible sting protruding from beneath the tip of the abdomen. Creeping among the yellow cocoons of the parasites, their long curling antennae appear to caress them and curve fantastically around the little shells and explore the hollows between them. On finding a suitable cocoon, the fly simply raises itself slightly on its legs and curves down the tip of its abdomen, shooting out the ovipositor at the same time. This pierces the yellow fluffy cocoon, and after some exploratory passes seems to penetrate the pupa within. The process is rapid, unlike the deliberate exertions of *Pteromalus*, and as soon as an egg has been laid, the fly rapidly moves on to another cocoon. It does not however appear to recognise the cocoon in which it has already laid one egg, for the same fly will return later to the identical cocoon and lay

another. But it does not lay more than once consecutively in the same cocoon.

Hemiteles is much more active and brisk in movement than *Pteromalus*, and does not wait upon events, but explores constantly for the bunches of cocoons which enclose its prey. It is shining black, with orange-yellow legs and dull black antennae which are velvety in appearance; the under surface of the abdomen is whitish; its wings are iridescent. The length varies from $2\frac{1}{2}$ to $3\frac{1}{2}$ mm., plus the length of the antennae, 2 to $2\frac{1}{2}$ mm. *Pteromalus* has a brownish-black body, which appears greenish bronze in some lights, and its legs are greyish or slightly yellowish. The antennae are hard and wiry, and hinged at a point about one-third of their length from the head. The insect's length is 3 mm. plus antennae 1 mm.

The origin of these parasites is mysterious; they appear at an appropriate time to deal with an excess of the host species which seems due to unpredictable causes. The reason for such an accurately timed appearance is not easy to discover, and is likely to remain a puzzle to the inquirer.

During October and November observations were continued upon the *Pieris* larvae, their parasites and hyperparasites, and as far as possible the numbers of each were estimated by a careful census of groups of *Apanteles* pupae, of apparently perfect chrysalids, and of chrysalids victimised by *Pteromalus*. In the latter case the chrysalis develops a reddish brown stain two to three weeks afterwards; at the end of five or six weeks it becomes pallid or a dull brown. *Pteromalus* was still active until the third week in October, while the last few *Pieris* larvae did not pupate until the end of the month or even the first week of November. These late caterpillars therefore escaped the attentions of *Pteromalus*. *Hemiteles* was not observed quite so late as *Pteromalus*.

During the winter months, November to January, a large proportion of pupae (of *Pieris*, of *Pieris* attacked by *Pteromalus*, and of *Apanteles*) disappeared. This for the most part seemed to be due to the Blue Tit (*Parus caeruleus* L.), which busily explored under the eaves and ledges. Spiders may also have been responsible in some cases. Owing to removal from Prestatyn to Bookham, Surrey, it was not possible to continue observations on the material *in situ*; a selection was therefore made on the 17th of January 1943, and transported to Bookham, where the boxes were regularly examined for "hatchings."

Hemiteles was the first to emerge, beginning on the 18th of April and continuing until the 6th of May; the total number was in the neighbourhood of 120 (a few escaped). The largest number to emerge on any one day was 37 on the 25th April, followed by 16 and 14 on the next two days. As *Hemiteles* requires the pupae of *Apanteles* for its subsistence, the experiment was made of placing a cluster of *Apanteles* cocoons on a window-sill on the morning of 1st May, about half-a-dozen *Hemiteles* being on the window, which was of course kept closed. On the next morning three *Hemiteles* were ovipositing in the cocoons, which were then boxed separately. From these cocoons four *Hemiteles* emerged

between the 30th May and the 4th of June. Two generations of *Hemiteles* are thus able to victimise one generation of *Apanteles*.

Meanwhile the butterflies were beginning to emerge from the perfect *Pieris* chrysalids. A total of 15 (14 *brassicae*, 1 *rapae*) hatched out between the 4th and the 20th of May. No *Pteromalus* appeared until the 13th of June, that is to say in time to find pupating larvae which could have resulted from the early May brood of *Pieris*. (Owing to circumstances which made it impossible to prolong the experiment, the butterflies and *Hemiteles* were all destroyed, and *Pteromalus* released.)

Only 9 specimens of *Pteromalus* emerged in the first five days, but on the morning of the 18th June 1943, I found that a very large number (over 80) had hatched out. The orgy of mating had begun, and the glittering metallic green-and-gold males were paying court to their more portly and soberly dressed mates. A female is strolling quietly along or stands preening her antennae: a dapper little gentleman rushes up, jumps on her back, using his wings for a kind of momentary jump. First, agitating his wings like fans, he stands on the lady's shoulders and strokes her neck with his fore-legs, leaning over and "kissing" her "forehead" with his palpi, while two pairs of antennae quiver and caress each other. From time to time he makes little feints backwards, but the preliminaries go on for some time before he finally backs half-way down his spouse's wings and with abdomen undercurved almost to a crotchet-hook consummates the marriage.

Afterwards he runs off without a backward glance, to seek for another wife of a minute. The conditions of captivity, with their problem of overcrowding, may cause abnormalities, but the most extraordinary scenes were enacted among the throng. While one male, firmly embracing his love's neck, was flirting with her antennae, another might be engaged in cuckolding him in advance, while a third would be clambering over the absorbed trio and performing acrobatic feats. Other males were mounting each other, in spite of the fact that there was no lack of unattached females promenading all around them.

The nuptials over, each female would stand for some time engaged in "doing her hair" most elaborately—at least, so one would have said after a glance with the naked eye. Under a high-powered glass the operation was seen to consist of passing the fore-legs methodically through the mandibles, and then passing them, in scissors form, down the whole length of an antenna. The process irresistibly reminded me of a cat washing its ears. Finally, a number of the flies being allowed their liberty, they took a few short trial flights consisting of a sort of hop or jump for a few inches, and then disappeared in the open air, or settled on windows and explored them methodically for pupae in which to lay their eggs.

The emergence of *Pteromalus* from the *Pieris* chrysalids is irregular, not all the flies using the same hole, but tearing a new one or enlarging an existing one at random. The holes are made in any fairly thin part of the shell, with apparently no special preference. By the time the fly has struggled through the hole, it is active and ready for mating. A

total of about 300 *Pteromalus* emerged from 14 *Pieris* chrysalids, the last hatching on the 27th of June. Just a fortnight was occupied in hatching altogether. Meanwhile, only three specimens of *Apanteles* emerged, between 30th May and 17th June, and after the end of June their box was left unopened until the 29th of August, when a total of 57 small flies was found, dead. These were submitted to the Imperial Institute of Entomology and identified by Mr Nixon as belonging to two species: *Dibrachys cavus* Walker, a Pteromalid, and *Tetrastichus rapo* Walk., an Eulophid, the former greatly predominating in numbers. Almost the whole of the *Apanteles* had thus fallen victims to three different hyperparasites, of which one, the *Hemiteles*, was able to rear two generations at the expense of "the gardener's friend."

A few remarks from the gardener's viewpoint may not be out of place. It is obvious (see Hugh Nicol: *The Biological Control of Insects*, Pelican, 1943) that once one interferes, either by hand-picking or by spraying, with the pest, in this case the caterpillars of the Large and Small White butterflies, one is upsetting the natural balance which is normally maintained between the various species concerned, as parasites and hyperparasites will be destroyed together with the host. In this instance the gardener's aim is to reduce the numbers of *Pieris* by increasing those of *Apanteles* and *Pteromalus*, and of course to destroy any hyperparasites.

While it is very improbable that this series of observations is representative of the normal mortality of *Apanteles*, it shows that the mere preservation *in situ* of groups of cocoons of *Apanteles* (a suggestion often made in gardening papers and popular books on British butterflies) may do more harm than good. For reasons discussed in some detail by Dr Nicol, control of insect pests by means of their parasites is seldom successful except in localities naturally isolated from surrounding areas. Only experiment over an extended period can prove the efficiency of any given method, but it might be worth the while of large-scale gardeners to attempt to assist the natural controllers of the White butterfly pest.

With some hesitation therefore, the following tentative suggestions are made as to the course to be pursued:—

1. Kill White butterflies at every opportunity.
2. Watch cabbages in late summer for eggs and groups of newly-hatched White caterpillars; do *not* destroy these, but transfer them to an isolated patch of cabbages grown for the purpose; allow these cabbages to be eaten. This patch should if possible be close to a wall or fence with accessible ledges under which the caterpillars of the late summer brood will pupate.
3. Watch pupating larvae, and gather into boxes all groups of *Apanteles* cocoons *as soon as possible*, to avoid victimisation by hyperparasites.
4. When remaining larvae have formed their chrysalids, wait a fortnight or so, then gather into boxes all pupae showing a brown stain. By the end of November all pupae *not* stained should be destroyed.
5. Keep boxes of *Apanteles* cocoons and of pupae victimised by *Pteromalus* until spring.
6. About mid-April examine *Apanteles* boxes; should any flies emerge in the next fortnight or so they *may* be *Hemiteles*. *Hemiteles* with its long antennae is roughly $\frac{1}{4}$ inch long, and shaped like a wasp or flying ant. Its legs are bright yellow. *These flies should be destroyed.*

7. Release *Apanteles* on emergence, in late May and early June. They are not quite as large as *Hemiteles*, but are less wasp-like, and their legs are not bright yellow. (See enlarged coloured illustrations of group of cocoons and perfect *Apanteles* in the Ministry of Agriculture Leaflet on *Some Beneficial Insects*.)
8. From early June examine *Pteromalus* boxes, and release on emergence.
9. *Dibrachys*, which seems to hatch out later in the season than *Apanteles*, is far smaller, appearing like a dark midge to the naked eye. Only further investigation could show whether destruction of unhatched cocoons of *Apanteles* at the end of June would prove a safe control on its late-season hyper-parasites.

NOTE.—Owing to wartime library difficulties, I have been unable to consult the literature of the subject, except for Fabre's classic essay on *Apanteles* (English translation in *The Life of the Caterpillar*, by J. H. Fabre; Hodder & Stoughton). The literature (see *Cambridge Natural History*) includes :—

Martelli : Contribuzioni alla biologia della *Pieris brassicae* L. e di alcuni suoi parassiti ed iperparassiti. *Boll. Lab. Zool. Portici*, 1, 1907.

Morley, C. : *Ichneumonologia Britannica*, vols. i-v, 1903-14.

Seurat : Contributions à l'étude des Hyménoptères Entomophages. *Ann. Sci. Nat. Zool.*, 10, 1899.

It is hoped that in spite of this these independent observations may nevertheless be of some interest, although they are confessedly incomplete.

TABLES.

PROPORTIONS OF *PIERIS BRASSICAE* L. PARASITISED.

	Number observed.	Percentage of total <i>Pieris</i> observed.
<i>P. brassicae</i> larvae victims of <i>Apanteles</i>	129	55.4
<i>P. brassicae</i> pupae victims of <i>Pteromalus</i>	45	19.3
<i>P. brassicae</i> pupae apparently perfect	59	25.3
 Total	 233	 100.0

NOTE :—The number of *P. rapae* observed was too small to allow of satisfactory figures being obtained.

NUMBERS OF LARVAE OF APANTELES IN ONE *P. BRASSICAE* LARVA.

15 specimen groups were counted; the figures were 22, 24, 25, 26, 55, 29, 35, 29, 14, 30, 32, 29, 30, 36, 22. The total of *Apanteles* cocoons amounts to 438, an average of just under 30 per larva.

CAPACITY OF *P. BRASSICAE* LARVAE FOR CLIMBING.

	Larvae victims of <i>Apanteles</i> .	Successful pupations.	Total.
On walls of house below 10 feet from ground	66	72	138
On walls above 10 feet, and under eaves, 17 ft. 6 in.	63	32	95
	 129	 104	 233

European Migrants in South Africa.

By G. BEVEN.

TO give even a brief account of all the European migrants which could be met with in South Africa would take considerable space as many species visit this country. However, many of these birds are rarely seen in England. Therefore I will confine my remarks to a few common "English" species and disregard birds like Rollers, Bee-eaters, Lesser Kestrels and Stilts which may often be seen here. Having little or no access to any literature on the subject I have written the following notes mainly from my own observations made over a period of twenty months and I can only claim a slight knowledge of very few districts.

The European Swallow (*Hirundo rustica*) is commonly met with in the summer months wherever there is a reasonable amount of vegetation. In the drier areas such as the Karroo it appears to keep near water and in all areas is more abundant there. It occurs in flocks of variable size, often quite small, flying over the rolling grassveldt or about the streams and marshes. Favourite sites for perching are telegraph wires near water, sometimes in hundreds. When these are not available numbers will often perch on molehills on the ground especially in windy weather. On cold days I have noticed many perching on "tarmac" roads; perhaps these spots are warmer. The Swallows arrive in November. At Port Alfred (Southern Cape) in December there was a large proportion of immature birds in which the back and wings were brownish and the chestnut areas were very pale, some appearing in the field to have almost white foreheads. However some were in fine plumage even then. Later on it was more common to see adult birds although there were still many "short-streamered" ones in early March. During this month song was often heard. It is interesting to note that other observers have recorded many present at Cape Town almost to the end of April. At Port Alfred no birds were seen after 1/4/43, but on the Highveldt (Transvaal) at the middle of the month flocks of several hundreds were still about and odd birds until the end of April, all apparently mature.

House Martins (*Delichon urbica*) I have only seen once when several were flying over a lake on 25/4/43.

The Willow Warbler (*Phylloscopus trochilus*) was quite common in the bush country in several districts including Oudtshoorn (Southern Cape) and in the Transvaal. I have seen it as early as 9/11/41 and as late as 18/3/43. Several at Oudtshoorn sang well all through November and they also sing from the beginning of March.

Spotted Flycatcher (*Muscicapa grisola*). This was found to be quite common in the Transvaal during March when I had a short holiday there. It is said to reach the Southern Cape in some years. Those I saw frequented the same type of habitat as in England.

Red-backed Shrike (*Lanius collurio*). This also I have only seen in the Transvaal where in March 1943 I found it quite common in "bushy"

areas. I first saw it perched on a bush in the Kruger National Park among lion and other big game. Once an immature male was seen in an interesting transition plumage in which the crown and nape were pale grey, and the back and wings a reddish-brown, paler than in an adult, while it had quite well-marked brown bars on breast and sides of body.

Several Arctic Skuas (*Stercorarius parasiticus*) were observed parasitising flocks of Sandwich and other Terns off the Southern Cape during March. Both light and dark and some confusing intermediate forms were present.

Waders are so numerous that they are best considered together. Anyone walking about near mudflats or wide shallow rivers during the southern summer might be excused for momentarily forgetting he was in Africa. The majority of birds are palaearctic waders and only here and there appear indigenous species. The migrant waders may be seen even on the more open parts of small rivers and little pools. The Greenshank (*Tringa nebularia*) is the conspicuous species, being very common and noisy. They are usually in ones and twos but sometimes in small parties, and I have seen a flock of a hundred feeding on a mudflat. The large flocks of smaller waders seen would be composed mainly of Little Stints (*Calidris minuta*) and Curlew Sandpipers (*Calidris testacea*). There may be several hundreds of each species. The Ruff (*Philomachus pugnax*) is also a common species, often present in parties of 15 or more. I have seen them from August to May. The Marsh Sandpiper (*Tringa stagnatilis*) although not a common English bird is mentioned as it is common here, on mudflats, shallow lakes and rivers. Curlew (*Numenius arquata*) are frequently seen, usually only a few but I have seen flocks of 80 or so at Knysna in the Southern Cape Province. Whimbrel (*N. phaeopus*) occurs also. They are generally less common but were numerous at Knysna in February 1942. Ringed Plover (*Charadrius hiaticula*) occur in parties often mixed with the others on the flats and apparently not usually seen away from the coast. The Avocet (*Recurvirostra avosetta*) is not uncommon in parts and I have seen a flock of about 150 on a lake at Cape Town. This bird is here both a migratory and a nesting species. Grey Plover (*Squatarola squatarola*) were only seen near the coast. Usually in ones and twos on mudflats, once 14 were counted dotted about over a wide stretch of mud. The plumage of one in February was interesting; the back was almost silver, the forehead prominently white, the underside and front of neck black with large white mottlings. All others seen were in winter plumage. Sanderlings (*Croceethia alba*) were seen more rarely, once a party of 30 on a sandy shore and once on mud by a river near the shore (Port Alfred).

The Wood Sandpiper (*Tringa glareola*) is, I should think, the commonest Sandpiper in South Africa. It occurs where there is slight cover as a rule, not apparently on the open mud, the marshy edges of lakes, rivers, pools whether fresh or brackish water, are chosen. Just before it leaves in April it assumes a plumage which must be almost, if not quite, its breeding dress. Another bird often met with, but not nearly in the same numbers, is the Common Sandpiper (*Actitis hypoleucus*).

As in England it tends to keep to the edge of rivers and lakes. The Turnstone (*Arenaria interpres*) I only observed once although it is said to be quite numerous. It was among other waders on a shallow lake in October and was in winter plumage.

The Survey of Bookham Common. SECOND YEAR.

Progress Report.

ALTHOUGH the close of the second year of the survey of Bookham Common has been marked by a considerable increase in the wartime difficulties under which the Ecological Section has been struggling, and organised work has been seriously affected by absence of workers, it is, perhaps, opportune to present the following brief report on current work and some suggestions for the future.

The investigation of the geology and soil conditions form an important background for an ecological survey, but it has been impossible, so far, to devote much attention to the subject. Contact has, however, been made with H.M. Geological Survey, where Messrs C. N. Bromehead and F. H. Edmunds kindly placed a large scale MS. geological map at the disposal of the Secretary who has made a copy for the use of members.

Some attention has been paid to the vegetation and fairly full lists have been made for some parts of the Common, but here, more so perhaps than in any other aspect of the Survey, the need is urgently felt for more workers.

Among the groups of animals, the birds and some orders of insects have been investigated. The ornithologists form the majority of the visitors to the Common and the result of their efforts appears below in the form of an annotated list. The list is doubtless the most complete yet available for any group, but, beyond some preliminary work on song-post distribution of some of the species, no real ecological work has yet been attempted. There is much useful work for the ornithologists to tackle and many problems such as nesting requirements, roosting habits, feeding areas and food, territories, choice of song posts, ringing and trapping, migration, etc., demand attention.

Among the insects, the *Odonata* are being worked as an Order by a small band of members, and it is hoped to prepare a paper on distribution at the end of 1944. In the meantime it may be of interest to record that the following 14 species out of the 28 known to be resident in Surrey have so far been observed during the progress of the survey, those marked with an asterisk being previously unrecorded for the Common : *A. cyanea*,* *grandis*, *mixta*,* *A. imperator*, *L. quadrimaculata*, *depressa*, *S. striolatum*, *sanguineum*, *A. virgo*,* *splendens*, *P. nymphula*, *I. elegans*, *E. cyathigerum*, *C. puella*.

With regard to *Coleoptera*, a long-term plan of study of comparative distribution is being pursued by one of our members. Three separate

semi-permanent ponds are being regularly examined, and it is hoped that an eventual analysis of occurrences of observed species combined with the relative plant distribution factor may offer some useful data and new knowledge to the survey.

Work on *Diptera* and *Orthoptera* has had to be suspended temporarily owing to the enforced absence of Messrs L. Parmenter and J. L. Harrison. Other Orders of insects are not at present receiving special attention, except incidentally by Mr H. J. Burkill in his investigations on plant galls.

A promising beginning has been made, but the outstanding need of the Ecological Section at Bookham is a fuller appreciation of the significance of ecology as a particular branch of natural history and a realization that a more intensive scheme of study is required than the mechanical compiling of lists of species. The stage of lists and group surveys is, of course, a necessary preliminary, but ecological work must consider not only the relations between the different species of any one taxonomic group of animals or plants, but the inter-relations of members of the different groups. To achieve this, much more collaboration between workers will be necessary, and in this respect there is as yet little to report.

However, it cannot be expected that activity in this survey will increase to any extent until the days of peace return. A number of the Society's enthusiasts are on active service, and those who remain have in most cases but little time to devote to natural history, so that it is inevitable that the Section's effort will appear comparatively feeble during the war years. Nevertheless, if those who are able at present to take part in the survey will devote themselves to the study of a few ecological problems rather than spreading their energies over a wide field it is reasonable to hope that valuable results may accrue.

C. P. C. and R. M. P.

Some Preliminary Notes on the Birds of Bookham Common.

By L. I. CARRINGTON, C. P. CASTELL, and A. R. WILTON.

These notes are based on the observations of members of the Ecological Section during the years 1942 and 1943, supplemented by a few records from *The London Bird Report* for the last ten years. They make no pretence to ecological value, but are intended primarily as a guide to visitors unfamiliar to the area and, it is hoped, will stimulate more intensive and systematic observations by members in the future. The grid reference numbers referred to under some species denote areas shown on the base map, *London Naturalist* for 1942, p. 28.

Eighty species are listed, all of which have been recorded within the last ten years and 76 observed in 1942-3. The numbers in front of each name refer to the lists in Witherby (1941) and Witherby *et al.* (1938-41), vol. v, where the full scientific name may be found.

The distribution of song posts and some nesting sites of 14 species was mapped in the early spring and summer of 1943 by A.R.W., and the

results are summarized under each of the species, and shown on the accompanying maps (Figs. 4 and 5).

The song-post figures are a fairly accurate census of singing birds. The accuracy obtainable depends upon the continuity of singing of the species under investigation; the distribution of the robin song posts for example may be considered as the most reliable and that of the hedge sparrow the least among those species mapped. Three days in early April were devoted to the residents, and eight days in late April and in May and June to the migrants. Much care was taken to plan each day's itinerary so as to cover the ground as systematically and completely as possible.

3. **Carrion-Crow.** One or two resident pairs may usually be seen in summer in Bayfield and Eastern Plains.
4. **Rook.** Abundant, especially at the northern end of the Common where, just outside the boundary close to Stents Lane in area 23, there is a rookery which contained some twenty-two nests in December 1942.
5. **Jackdaw.** Fairly common, but seen only in flight over the neighbourhood of Central Wood and Isle of Wight.
7. **Magpie.** Not by any means a common species, usually observed either on Western Plain or on the adjoining pasture land off the Common. Young birds have been seen in Western Plain and the species undoubtedly breeds nearby. Nested in 58, March 1943.
11. **Jay.** Surprisingly infrequent. Nested in 58, where young and adult birds have been seen on more than one occasion.
14. **Starling.** Not so abundant as would be expected. The use of Woodpecker holes as nesting sites has not been observed.
18. **Hawfinch.** The Common forms a most suitable habitat for this finch. Although it is never in great numbers, it is usually to be seen, and flights of as many as 8 birds have been observed from time to time. It has a predilection for perching in tree tops, preferably oaks.
19. **Greenfinch.** Usually abundant in the winter on the cultivated fields by the northern and western sides of the Common, and on the sewage farm (75), but not often seen and probably not resident on the Common.
20. **Goldfinch.** Appeared in considerable numbers in 1943, two or three charms being observed on the thistle tops in Isle of Wight, Bayfield and Central Plains on more than one occasion, but it is seldom to be seen in the breeding season.
25. **Lesser Redpoll.** Very scarce, occasionally heard but only on the wing while passing over.
30. **Linnet.** Not often recorded, but a flock of 20 was seen in February 1943.
33. **Bullfinch.** Moderately abundant; nests annually, adults with young being observed resorting to the more thickly wooded parts.
41. **Chaffinch.** 23 song posts were observed in April 1943 (see map). One of the commonest species and found in all parts, both marshy and wooded, and in the cultivated grounds adjoining the Common. Nesting sites were found in 1942 and 1943, chiefly round the margin of the Common.
61. **House Sparrow.** Seen in one or two of the smaller copses, but, as a rule, found only as a marginal species. It nests on the rafters of the railway station roof.

44. **Yellow Bunting.** Not a common species, although their numbers are augmented during the winter months. Has nested during 1942 and 1943, parents having been observed feeding their young.
49. **Cirl Bunting.** A pair was seen, 27/4/1940. (L.I.C. and A. C. G. Poore in *L.B.R.* for 1940, p. 5.)
55. **Reed Bunting.** A most suitable habitat for this bird, one to three pairs regularly remain all the year. Nested 1942, and during 1943 two nests were found, one containing the rather unusual number of five eggs. During winter months, several cock birds feed on the adjacent sewage farm (75).
70. **Skylark.** Occurs in limited numbers. Probably three pairs nest in Bayfield and Western Plains.
75. **Tree-Pipit.** Nine song posts were observed in May-June 1943 (see map). A moderately common summer migrant, usually found in the open plains. Young have been observed being fed by adults.
76. **Meadow Pipit.** Most common during the winter months, when it congregates in fair numbers on the sewage farm (75) and in fields adjacent to the Common, but is rarely recorded in the breeding season.
90. **Pied Wagtail.** Usually one or two may be seen flying over the Common, or perched on the roofs of the few houses bordering it.
93. **Tree Creeper.** Not common, but seen throughout the woods, with perhaps a preference for the woods adjoining Hill House (19, 27), where the remains of a nest were found in some old stacked timber. Nesting attempted in a vertical crevice in the bark of an oak (91).
96. **Nuthatch.** A few frequent the northernmost part of the woods. The woods near Hill House, where young birds have been seen, appear to be its favourite haunt.
98. **Great Tit.** Abundant and generally well distributed throughout the area, the resident birds being greatly augmented in number during the winter months.
100. **Blue Tit.** Common, the resident birds being greatly augmented in winter.
102. **Coal Tit.** Never so common as either of the preceding birds.
107. **Marsh Tit.** About as plentiful as the Coal Tit. A flock of six has been seen.
108. **Willow Tit.** Not recorded in 1942-3, but at least three were seen in 1938 (R. S. R. Fitter in *L.B.R.* for 1938, p. 8); three seen together in birch trees in 1940 (H. Bentham and L.I.C. in *L.B.R.* for 1940, p. 6), and one in 1941 (R. S. R. Fitter and J. E. Roberts, *L.B.R.* for 1941, p. 7)
111. **Long-tailed Tit.** Nests (N) or pairs observed in the breeding season in 1943 in 189, 279, 357, 419, 513, 557 (N), 567, 594, 677, 766 (N), 813 (N), 853, 883 (N), 941. Abundant. Of four nests found in March 1943, three were destroyed, yet many adults and young birds were observed on the Common.
119. **Red-backed Shrike.** At least three pairs nested in 1942 and three in 1943, in nearly all cases successfully. The characteristic larder of this species composed of various hymenoptera, beetles, etc., was observed very close to one of the nesting sites. A territorial fight was witnessed in 1942 between two cock birds, who ultimately staked claims in Western and Central Plains. The species is restricted to the wet, grassy plains to the west of the Common. Territories were observed at 765, 815, 873, 891 in June 1943.

SONG POSTS OF RESIDENT BIRDS

C CHAFFINCH
H HEDGE SPARROW
R ROBIN
W WREN

1943

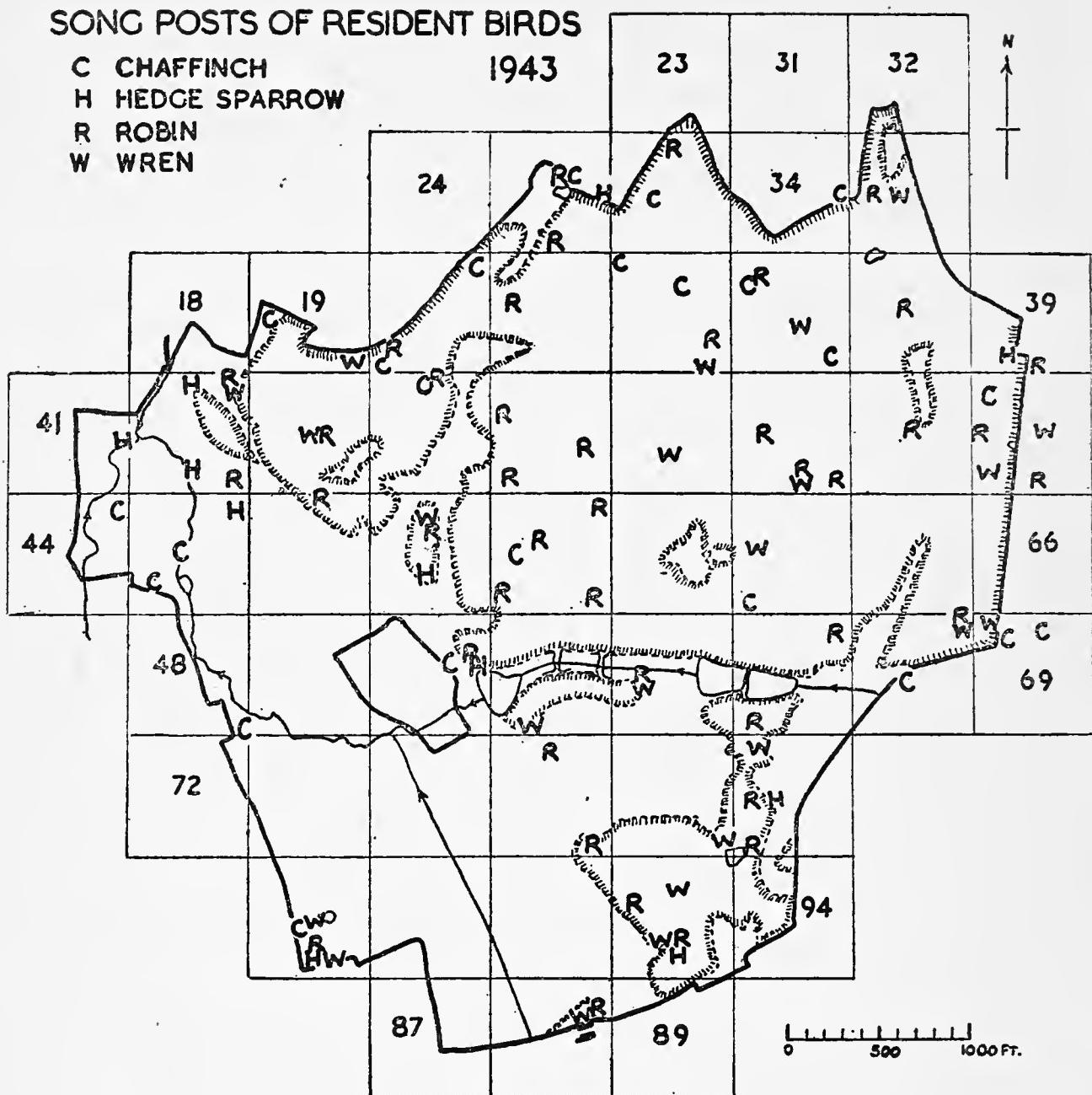


Fig 4.

121. **Spotted Flycatcher.** One or two pairs have been observed each year. A pair nested in an old apple tree in the Isle of Wight in 1942, but the nest was robbed. No nest was observed in 1943.
127. **Goldcrest.** Found occasionally in the winter, mainly by the eastern fringe of conifers.
129. **Chiffchaff.** Nine song posts observed in May-June 1943 (see map). A moderately common summer migrant, restricted to the woods.
132. **Willow Warbler.** Abundant and distributed widely over woodland and scrub. It nests regularly and in 1942 one nest containing a very full clutch of seven eggs was found.
135. **Wood Warbler.** Very scarce, only one or two males observed; no females have been seen or flushed from what would appear possible nesting ground.
145. **Grasshopper Warbler.** As many as 20 were seen in 1934, but it appears now to be an erratic and decreasing visitor. During observations made in recent years up to 1942, at least one pair has nested, and others have been seen and heard on Bayfield Plain. One male was seen during May 1943, apparently as a passage migrant, for the species was absent during the latter part of the season.

SONG POSTS OF MIGRANT BIRDS

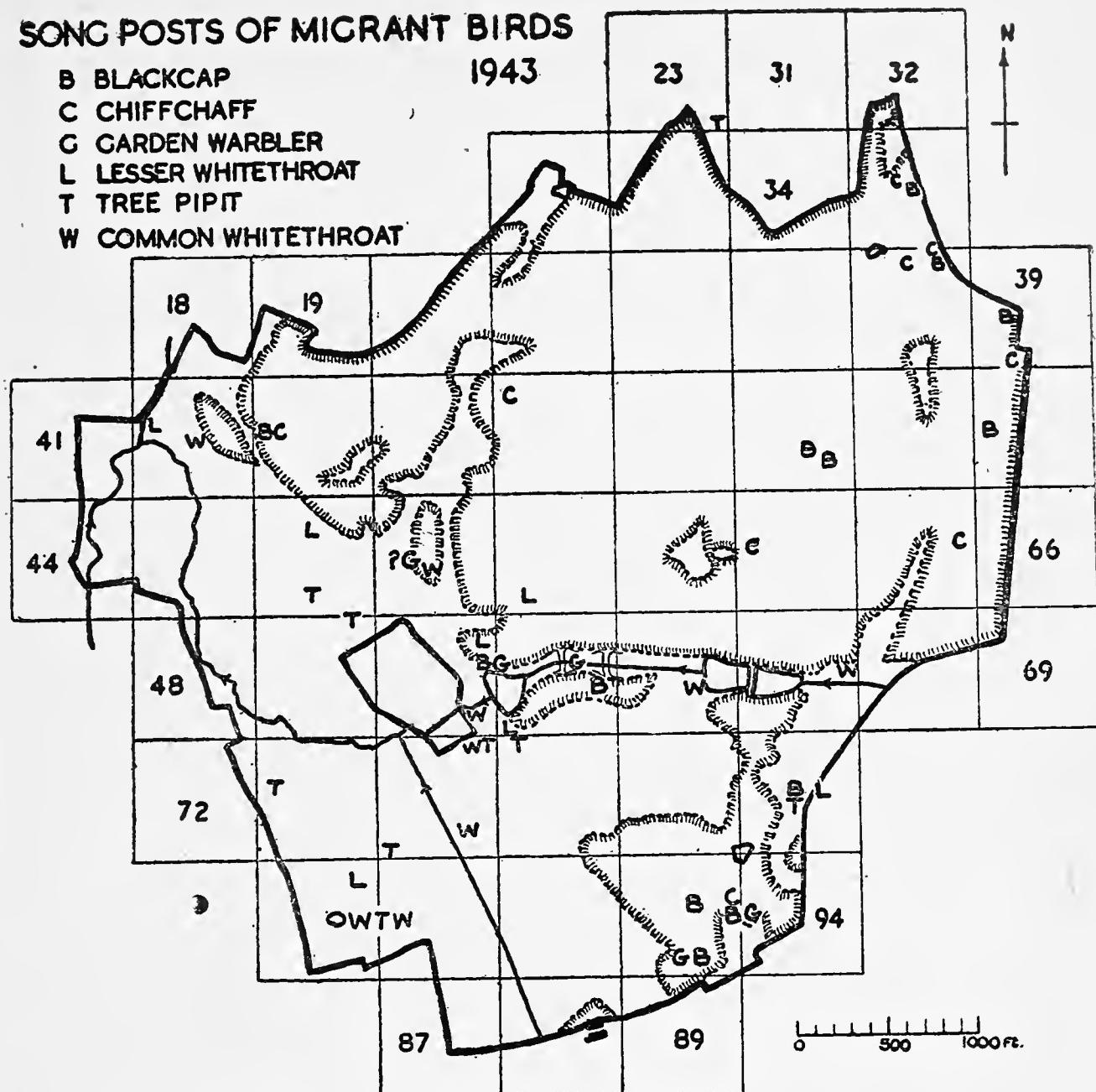


Fig 5.

153. **Sedge Warbler.** Recorded prior to 1934 (L.N. for 1934, p. 124).
161. **Garden Warbler.** Five song posts were observed in May-June 1943 (see map). More abundant in 1943 than in preceding years, but never a common species. Four of the song posts adjoined those of the Blackcap.
162. **Blackcap.** Thirteen song posts were observed in May-June 1943 (see map). During the early part of April 1943 a large number were present for one day, when an influx seemed general in the southern part of England.
163. **Common Whitethroat.** Nine song posts were noted in May-June 1943 (see map). Well distributed over the plains; one or two nests have been observed annually.
164. **Lesser Whitethroat.** Seven song posts were recorded in May-June 1943 (see map). A pair and three young seen in 54 in June 1943.
174. **Mistle Thrush.** Even in the autumn and winter this is a scarce thrush, usually only a single bird being seen. A nest, which appeared to belong to this species, was found unoccupied in Hill House Wood in June 1943.

175. **Song Thrush.** Fairly generally distributed, but does not appear to have been recorded for the wooded area. Several nests have been found.
178. **Redwing.** A flock of 15 seen in 41 in the winter of 1942-3 on hawthorns. Plentiful in the winter of 1943-4.
184. **Blackbird.** The commonest thrush, mainly marginal in distribution with a preference for gardens and cultivated fields. Several nests found annually.
187. **Greenland Wheatear.** A pair seen, 12/5/1934 (R. C. Homes in *L.N.* for 1934, p. 107).
197. **Whinchat.** Nested prior to 1933 (*L.N.* for 1933, p. 116), in 1934 (L. Parmenter and J. E. Roberts, *L.N.* for 1934, p. 107), and probably in 1935 (H. Bentham, *L.N.* for 1935, p. 104). A pair seen in the breeding season, 1938 (J. S. Wightman, *L.B.R.* for 1938, p. 10).
198. **Stonechat.** Nested in 1933 (*L.N.* for 1933, p. 117) and 1934 (L. Parmenter and J. E. Roberts, *L.N.* for 1934, p. 108).
201. **Redstart.** A migrant of very uncertain appearance. One immature bird recorded at 82 in 1942.
203. **Nightingale.** Song posts in 861 and 892 in May-June 1943. Scarce, usually about two pairs.
208. **Robin.** Forty-two song posts recorded in April 1943 (see map). Abundant, with a fairly uniform distribution throughout the wooded areas.
211. **Hedge Sparrow.** Eleven song posts recorded in April 1943 (see map). Common in open scrub and at the margins of the woods.
213. **Wren.** Twenty-three song posts recorded in April 1943 (see map). One of the commonest woodland birds, nesting sites found in various localities.
220. **Swallow.** A few are seen annually.
222. **House-Martin.** A few are seen annually.
223. **Sand Martin.** Recorded in the past, but not seen in 1942-3.
225. **Swift.** Usually seen flying fairly high over the Common, sometimes in considerable numbers.
227. **Nightjar.** This species was reported on Bayfield Plain in 1942 by a resident on the Common, Miss V. Tester, but the number of birds is not known. A special all-night watch in 1943 gave no satisfactory evidence of the presence of the bird.
235. **Green Woodpecker.** Fairly common over the entire area, with evidence of nesting, especially in 45, 65, Stents Wood, and Central Wood where an adult and two young were seen in June 1943.
237. **Great Spotted Woodpecker.** Nesting holes, probably of this species, have been seen in 25, 26, 34, 19 (3), 27 (2), 38, 43, 45, 65, 58 (2), 59, 67, 86 (3). Three or four pairs may possibly occur. Two nests were found in 1943 in oak and ash, in one of which the male was observed feeding young. It is most frequently recorded in the northern parts of the Common.
238. **Lesser Spotted Woodpecker.** Nesting holes, apparently of this species have been seen in 27, 29, and 83. The rarest of the woodpeckers, observed only on a few occasions, but not in the breeding season.
239. **Wryneck.** One to three pairs appear to visit the Common at irregular intervals, and a pair successfully reared young in a hole in an apple-tree in 1942.

240. **Cuckoo.** Generally well distributed over the Common in the summer. A large number was observed in 1942, but the bird was not so frequent in 1943.
249. **Little Owl.** Fairly well distributed as a marginal species, especially near the fields adjacent to the Common on the north.
254. **Barn Owl.** Very occasionally heard. One seen in 1942 and another during all-night walk on Common in 1943.
263. **Kestrel.** One or two may usually be seen hovering for prey over the plains. One or two nests have been found, apparently of this species.
277. **Sparrow Hawk.** Nested in Central Wood, young observed being fed by parents, when probably three young were reared successfully. Two months later, further young were seen suggesting the nesting of another pair.
289. **Heron.** Occasionally disturbed at ponds and frequently seen flying over.
317. **Mallard.** Seen occasionally on the ponds and streams. Several in spring 1943.
375. **Little Grebe.** Nested 1933-4 (*L.N.* for 1934, p. 126). One on U.E. Pond in 1942.
380. **Wood Pigeon.** Common and well distributed. Several nesting sites have been recorded.
381. **Stock Dove.** Much less frequent than the Wood Pigeon.
383. **Turtle Dove.** Appears in fair numbers as a summer migrant and fairly well distributed. Nest with one egg found in 1942.
395. **Common Snipe.** One or two birds occasionally frequent the more marshy parts of the Isle of Wight and Bayfield Plains. Has bred in the past.
449. **Lapwing.** Frequently seen flying over most parts, but only occasionally seen on the Common, usually resorting to the adjacent fields.
510. **Moorhen.** Observed fairly frequently throughout the year on the ponds; nested successfully in a willow 20 feet above the water at Bayfield Pond, 1943.
511. **Coot.** Occasional birds, possibly a pair, seen either on the ponds or near the various brooklets.
517. **Pheasant.** Frequently seen in the woods; nested 1942, when adult and five young were encountered in Stents Wood.
518. **Common Partridge.** A fairly common resident, nested near the Isle of Wight, 1943.
519. **Red-legged Partridge.** One seen in 67, June 1943.

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The Survey of Limpsfield Common.

SEVENTH YEAR.

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C. P. C.

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 Third Year. Parmenter, 1940.
- Topography. Parmenter and Thomas, 1937; Robbins, 1938.
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Reading Circles.

THE following reading circles are run by various Sections and members. Members wishing to join or to obtain further details should communicate with the Sectional Secretary (addresses on p. 50) except where otherwise indicated. Annual subscription indicated in brackets.

- British Birds* (2/6). Ornithological. Mrs D. H. Clanchy, Westminster Bank House, Harrow-on-the-Hill, Middx.
- Entomologist*. Entomological. H. J. Burkill, 3 Newman's Court, Cornhill, E.C.3.
- Entomologist's Monthly Magazine* (2/6). Entomological. H. J. Burkill.
- Entomologist's Record*. Entomological. H. J. Burkill.
- Geographical Magazine* (2/6). General Secretary.
- Journal of Animal Ecology* (2/6). Ecological.
- Journal of Ecology* (2/-). Ecological.
- Journal of the Commons, Open Spaces and Footpaths Preservation Society* (free). Ramblers.
- North Western Naturalist* (2/-). H. J. Burkill.
- Report of the Botanical Society and Botanical Exchange Club* (1/-). Botanical.

The Epping Forest Survey. SECOND YEAR.

Progress Report.

By the Council of the Chingford Branch.

FOR reasons which, it is hoped, will not apply in 1944, it has not been possible to make a great deal of progress during 1943 with detailed work at the Cuckoo Pits.* In consequence it has seemed wiser to postpone reports on this work until next year. However, two important general investigations have been made, concerning the forest area as a whole. These are: (a) A new presentation of the history of Epping Forest, the work of Mr C. S. Bayes; and (b) The climate of the forest, as represented by the rainfall and temperature records for Chingford; the analysis has been made by Dr D. G. Tucker from the original observations (over 40 years) by Miss M. L. Mathieson.

The history has been presented as a lecture by Mr Bayes to both the Branch and the Central Society, and is published in this report in a somewhat abridged form. The rainfall and temperature figures have been analysed in considerable detail for Branch records, but again only a summary appears in this report. The original papers are available for inspection, if required.

A Historical Sketch of Epping Forest.

By C. S. BAYES.

On such days as August Saturdays before the war, when Chingford Plain was a white waste of paper, and even in the deepest thickets the drone and wail of traffic quivered in the songless, sultry air, the lover of Epping Forest could wryly reflect that, by some turn of fortune now sinking into the lap of history, this unique area had been preserved for the enjoyment of the people.

In the popular sense of the word, "forest" means thick woodland, and Epping Forest is certainly that. But the legal and etymological meaning is "place of wild beasts," which the Forest is also; and since Danish times the wild beasts were understood to be "beasts of the chase," which exist to-day in the dark, softly-moving forms of the fallow deer.

There have been deer in these parts for more than ten thousand years, though in those farthest times they were reindeer. They roamed about the snow-swept, moss-covered ridges among patches of stunted birch and arctic willow. As the climate became moister with the northward movement of the ice-cap, the reindeer moved northward, too;

*A preliminary account of this work was published last year in *The London Naturalist*, p. 43.

and in the pine-woods which later spread, red deer lived and moved. The pines in turn gave place to oaks, and by 7000 b.c. a vast oak-forest was firmly established on all the ridges and uplands of Essex. Human life was concentrated on the borders of streams, for the forest impeded movement, and man the hunter gave way to man the cultivator, for whom the forest was not only a dark horror full of evil spirits, but the home of his enemies, the wild animals.

Though many peoples from the continent of Europe came, and introduced their ways of life and passed on, it was not until the Celtic tribes of Upper Austria arrived in the Lea Valley about 600 b.c. that the forest was used with some freedom and lack of superstitious fear. These people, the Trinobantes, lived in pile-dwellings at the edge of the Lea, kept cattle, and tilled the gravel terraces above (1). They knew that the Lea was the highway and the entrance to their lands; and that where they had come, others could also. So they built stockaded dwellings as protection against man and beast, and hill forts for shelter and defence. Cobbins Brook and the Ching Valley led to the forest uplands by easy gradients, and along these routes retreat was made in times of difficulty. To this period probably belong Ambresbury Banks and Loughton Camp. Wild cats, wolves and boars lurked in the woods, and beavers built their dams in the river.

These people were unconquered by later invasions and by the time of the Roman occupation had a dense population. They had chariots; and chariots indicate roads. Their dwellings started the Essex tradition of timber and plaster (2). The story of their subjugation by the Romans, and of their smouldering resentment culminating in the resistance of Boadicea, has been fully chronicled. Legend has long connected Ambresbury Banks with the great battle described by Tacitus (3); suffice it to say that his description of "a position approached by a narrow defile, closed in at the rear by a forest," may possibly refer to the Loughton-Epping area.

Colchester was the Roman centre for the Eastern Counties, and from there Stane Street led to St Albans and the Great Road to London, both of these having later significance as forest boundaries. It is probable that the Romans cut down considerable portions of forest, chiefly alongside the roads, for greater safety, and near the settlements for cultivation.

Roman rule ended in disorder at the beginning of the fifth century; the new Teutonic invaders, seeking sanctuary and settlement in these islands from the westward-thrusting Huns, had little use for the forest, which they feared, though they settled fairly thickly in Essex (4). But in all these centuries before the Norman conquest, and in spite of the variety of new immigrants, there is little to suggest that the forest of Essex was changing. One clue is the place-name ending "-field," whose original Scandinavian meaning is "clearing in the forest" (5). The distribution of such names is significant in that few are in the extreme east of the county.

Royal huntsmen are mentioned first in the colloquy of the Abbot Aelfric, written in the tenth century, and their job seems fairly pleasant. The wild beasts were driven by hounds into specially-prepared nets, or were run down on foot; boar, hart, roe and hare, whatever were the spoils, were presented to the King, who, in return, fed and clothed the hunter well, rewarding him with horse or bracelet for special skill. Better his lot than the ploughman or shepherd in the same record, toiling long hours, fighting off the wolves and protecting the plough-oxen from thieves by night. But the royal interest in the forest was becoming exclusive; and it is certain that forest laws existed under Canute, and that the penalties for breaking them fell on all, bar abbots, bishops and thanes.

1066 can conveniently mark for us the end of the period when the forest-wastes were merely the acorn-grounds for pigs, and no-one's especial property and care. William the Conqueror's first and fundamental assumption, on which all his laws were based, was that he was the legal owner of all the land in England. Thus, the lords of the manors held their lands directly from the King, to whom they owed fees and service (6). But the forest, with everything that grew or lived within its boundaries, was the absolute property of the King and its sole purpose was royal sport. A thorough social and administrative change was wrought by the Norman (7) and the new forest laws, savage in their severity, applied to all Essex save a small portion in the north-west.

The new organisation was efficient and complete, and it is only possible to summarise the system here. The forest was divided into "walks," each under a forester, whose duty it was to preserve the rights of "vert and venison," to arrest offenders, and present them at court. His office was held direct from the King and was transferable only by royal licence. Other officials were the woodwards, whose care was the timber; regarders, who had to report encroachments on the forest; agisters, who superintended the feeding of domestic animals; and reeves, who branded the cattle. Apart from these key-men were plenty of under-keepers and huntsmen (8). Minor offences were tried and punished at the Court of Attachments (held every 42 days by the verderers); another Court, that of Swainmote, met three times a year to hear more serious charges, but could not pass sentence; it passed the cases on, a year later, to the Court of Justice Seat, presided over by the Chief Justice of Forests, who had the final decision.

Punishment not only included imprisonment and heavy fines, such as £10 for a mad dog loose in the forest, and £60 if it bit a wild animal, but bodily mutilation and death. To assault a forest officer meant the loss of the right hand, and a serf who chased and killed a royal stag forfeited his own life. Nobles and ecclesiastics were largely exempt, and were tried only if they killed a stag without permission. (Seeing that the church collected a tithe of the fines there is, of course, no reason why the Abbots of Stratford and Waltham should wish the punishments lighter for their less-privileged brothers). But if a serf

so much as caused a hart to run so that it panted for breath, he was scourged—or, in the exact word of the law, “ he shall lose his skinne,” literally (9).

The distribution and numbers of the animals were changing meanwhile; the wild boar, which had been so plentiful and destructive in the days of Canute, was now under special protection as a “ beast of the chase ”; and wolves were probably extinct by this time.

It is one of the truths of history that in the wake of the dictator comes chaos. So after William died, there were stormy years when barons and King struggled for mastery. Henry I and Stephen gave away much of the forest to keep the support of their friends, and Henry II on his accession promptly put the lands back in his domain. Richard I subsequently sold much of it again to get money for the Crusades. This state of confusion lasted till 1217, when the *Charta Forestae* was forced from Henry III. The load of tyranny was lightened somewhat; freemen were now permitted to plough their lands within the forest boundaries, the right of pannage, i.e., keeping pigs in the forest, was restored, the boundaries were set as in 1154, and, very important, the penalties were revised in the tenth heading:

“ No man shall henceforth lose either life or member for killing of our Deer. But if any man be taken, and convict for taking of our Venison, he shall make a greivous fine, if he have any thing whereof; and if he have nothing to lose, he shall be imprisoned a Year and a Day; and after the Year and Day expireth, if he can find sufficient sureties, he shall be delivered; and if not, he shall adjure the realm of England.”

Cap. 13 is of interest to us in hinting of the abundance of large birds six hundred years ago: “ Every Freeman shall have, within his own Woods, ayries of Hawks, Sparrow-Hawks, Faulcons, Eagles and Herons; and shall have also the Honey that is found within his woods.”

It was a feature of the Forest that, though unfenced, it had definite boundaries, determined by perambulation. In 1225 such a perambulation, ordered by the King in accordance with the *Charta Forestae*, Cap. 1, was undertaken; and having been “ viewed by good and lawful men ” only the south-western quarter of Essex was judged to be Royal Forest. This result was not to Henry’s liking, and in 1227 he quashed the charter. By 1250 he had foresters, verderers and all the other officials all over the county, even at Tendring and Tiptree; yet it is judged that long before this the wooded parts of Essex lay mostly west of a line drawn from Tilbury to Haverhill (10).

It is, of course, not to be wondered at, that the Kings should attempt to keep as much land as possible under Forest law, for it meant additional revenue to them; the only administrative change was that, whereas formerly the laws had been the fruit of their own despotic whim, there was, since 1225, a small advisory body of councillors. In 1277, Edward I issued a proclamation that “ The Forest of the Lord the King in Essex is from the bridge of Stratford unto the bridge of Cattywad in length, and in breadth from the Thames unto the King’s highway which

is called Stanestrete." But increasing disaffection made him consent to another perambulation in 1301 and the 1225 boundaries were roughly restored (11). Perhaps it is significant that, about this time, the forest was being called, not the "Forest of Essex" but the "Forest of Waltham" (5); at the latter place, a hunting-lodge had existed for many years (12). And the Charter was confirmed subsequently by Edward III (1327), Henry IV (1405), and Henry V (1416) (13).

Just as important as Kings to the forest, and not nearly so much trouble, were pigs. They played an immense part in the economy of the countryside, and the right of pannage reflected this. One of the features of the Domesday Book is that the number of pigs in each parish is listed; this gives a clue to the extent of the forest, for acorns and beech-mast were their food. Using as a basis the number of pigs per 100 acres, Dr Round has calculated that a thick belt of woodland continued beyond Epping through Ongar as far as Thorndon, near Brentwood. Farther north, the Takeley area contained particularly dense woodland. Pannage meant that from the middle of September to the middle of November each year, pigs with rings on their noses (that was a rule) grubbed in the forest, and the owners paid one penny per pig for the privilege.

Not all animals were so favoured: sheep were severely restricted as the deer (especially red) refused pasturage where they had fed, and goats were a dire offence as they tainted the pasture. Any found were immediately seized without redress, fifty-six being so confiscated in 1323 alone. Geese were also taboo (8).

Cattle were allowed on the forest for eleven months of the year; for the remaining period, called the "fence-month," from 21st June to 21st July, the deer needed quiet and protection. However, the number of cattle allowed was regulated, and if at any season, food had been scarce, they were barred from the forest. All had to be branded with the mark of the parish, being a letter usually surmounted by a crown. (This system of intercommoning of parishes was unusual for England, though bearing a resemblance to the mark system in Germany) (14). Any cattle not removed from the forest in the fence-month was impounded, and auctioned after seven days at Epping, Waltham Abbey or Romford.

Not only were cattle withdrawn from the forest during this time, but the regulations against men were tightened also. Even in normal months, a toll was exacted from whosoever required passage through the forest, on account of the disturbance to the wild beasts, and it was absolutely forbidden for a cart to leave the highway; but in the fence-month special permission was needed to enter the forest at all.

The number of deer must have been enormous in mediaeval times. There are many records of fee-deer, that is, yearly gifts; and many nobles were presented with deer to stock their parks, thirty or forty at a time being often granted. Hard winters and disease wore down the numbers when they became too prolific, and in 1489 alone, 316 were found dead, mostly of murrein (8). Fallow-deer were by now commoner and the roe was also in fair numbers.

Every deer found dead or wounded had to be reported by the foresters, and some of the records make interesting study. "A doe killed at Rokoll (Leyton) by butcher's dog of Edmonton and given to ye poor;" "A buck found killed with pitchfork and hanged up;" "One buck found with back broken fighting with one of its fellows;" "A buk smyte with a smale arrow, ded and lost. God save the Kyng." Several of the deer thus found are mentioned as being given to the poor, and our hearts are duly warmed by this generosity. But a true explanation is found in an unimpeachable source: "The ordinance that flesh of wounded or dead deer is to be sent to the nearest leper's house, or, if none is near, to the poor and infirm, must be intended to apply only to such deer which are not sweet or fit to be eaten by the better sort of people" (15).

Poaching was obviously common in spite of the fact that to keep crossbow or nets was an offence in itself, and that even to keep a dog capable of hunting was forbidden to laymen with less than £2 per annum and priests with less than £10. (This distinction is certainly curious and probably significant.) Even keepers were forbidden to have bows and all dogs within ten miles of the forest were examined at intervals to have three claws from each foot chopped off. A few of the privileged landowners were allowed by special royal licence to hunt with a specified number of dogs for specified animals, usually badger, wild cat, fox and hare. But they were not allowed to hunt at night! (8).

To realise how fully the whole forest administration centred on the deer we need consider only the rules governing the woodlands. No man might cut down a tree, even in his own freehold. If, in an estate, it were possible to see five felled trees at once, the wood was judged waste and seized on the King's account. Every owner had to appoint a woodward; if he failed, or if he were neglectful, the woods were seized by the King. (Of course, it must be understood that they were recoverable—at a price.) All woods had to be fenced, with fences low enough for a doe and her fawn to pass over (9). Some ingenious owners therefore made "deer-leaps," whereby the deer could jump into the estate but not out again.

Vegetation which was the food of deer—the pear, crab-apple, thorns and holly—formed a special class, of which the King's woodwards had special care. One of their main tasks was the supervision of pollarding. This was a privilege enjoyed by the occupiers of houses in the manor and parish of Loughton to lop for their own use as fuel, from 11th November to 23rd April, the boughs and branches of trees about six feet from the ground. Monk Wood was not allowed to be touched, and to lop trees marked by the woodward for future growth was a punishable offence.

For five hundred years the sovereigns of England hunted in Waltham Forest. Queen Elizabeth was a frequent visitor though the hunting lodge with which her name is linked is thought to date from an earlier reign (16); by the end of her reign the forest laws were being disregarded. Poachers were much bolder, worked in gangs and gave a rough time to any keeper who tried to interfere. They still used both cross-bows and long-bows, presumably because of their silence. Small houses and cot-

tages were springing up on forest land, together with brick-kilns and gravel-pits. This encroachment was no new thing, for as far back as Henry III there are long recorded lists of fines for the tillage of forest clearings (12).

The accession of James Stuart saw a great stiffening of the rules; he hunted frequently and threatened to revive the forest laws in all their severity. The position of the inhabitants was hard; and prosecutions were so numerous that a gaol was built at Stratford, solely for forest offenders. One legacy of his reign remains to-day—the road from Goldings Hill to Epping, finished in 1622 (17). Charles I made an attempt to restore the forest boundaries of Edward I, that is, from Stratford to Manningtree. There was a court to sanction this and its procedure is enlightening: thus, Sir John Finch, the King's Advocate, “pressed the jury to give a verdict without going from the box: but the foreman making some scruple he fell into a rage, threatened and swore that he would have a verdict for the King before he left; threatened whoever voted against the King, and refused a view of his documents.” The object of this extension of boundaries was simple; to get the money that Parliament refused him. The method, too, was simple: owners of houses and estates were fined for having encroached on forest land. If this crippled them, they had to go. But if they had any money left, they could then pay to have their land removed from forest law. By this means, £300,000 was raised in Essex by 1640. In that year it was announced that “His Majesty, understanding that Forest laws are grievous to subjects of this kingdom, out of his grace and goodness to his People is willing that the Bounds be reduced to same condition as before” (18). (Essex was very pro-Cromwell in the Civil War.)

The Commonwealth brought the first sharp break in forest history; no longer was the Forest for the King's “pleasure, disport and recreation from these pressing cares for the publique weale and safetie, which are inseparabile incident to theire Kinglie office” (19). The first order was that all forest belonging to the late King was to be sold for the benefit of the Commonwealth. In a few years we detect a change, for in 1654, His Highness the Lord Protector ordered the restoration of forest rights and the letting of enclosures (8). But there was immense wastage during this period due to the lack of responsible officers, and in 1664, after Charles II had been reigning four years, the chief ranger of Waltham ordered that no fallow or red deer should be killed in the forest for three years, owing to the severe destruction of game during the civil wars. And this was in spite of the fact that James I had caused some fallow-deer to be imported from Norway and transferred to Waltham Forest (12), from which time fallow far outnumbered red deer. By now, however, the forest was regarded as a utility, chiefly a nursery of timber for the navy, and fines for “vert” offences were heavy. There is a note of anxious alarm in this memorandum of 1670: “If many more pollard oaks are felled, all His Majesty's oaks in Waltham Forest will soon be destroyed” (12).

The lawless had quarry other than deer at this time; for the days of the highwayman were in full bud. The “Waltham Blacks” were notori-

ous and feared. They were originally discharged soldiers from the Civil Wars, living in a settlement at Waltham Cross. They were so powerful that they signed and sent a manifesto to the Government, and cavalry had to patrol the area every night for the protection of travellers (20). A verse by John Byrom sets the scene :

“ Now then, as fortune had contrived, our way
Thro’ the wild brakes of Epping Forest lay.
With Travellers and Trunks a hugeous load
We hagg’d along the solitary road,
Where nought but thickets within thickets grew
No House nor Barn to cheer the wandering view,
Nor lab’ring Hind, nor Shepherd did appear
Nor Sportsman with his Dog or Gun was there ;
A dreary landscape, bushy and forlorn,
Where rogues start up like Mushrooms in a Morn.”

We note that by this time (1728), “ Waltham ” was no longer the forest title.

The feature of the early part of the 18th century in the forest was the positive mania for wood-cutting, 680 acres so disappearing between 1713 and 1723, while licences to stub up woods were also issued. The applications to cut down trees averaged 250 a year and the Lieutenant announced that he never refused leave either to cut or enclose (8).

One unfortunate effect of the enclosure movement was that the cultivation of the land fell into the hands of those who could buy or grab the complete fields essential to the new system. And naturally forest wastes were tempting. How this affected Epping Forest may be shown by the following recorded case (21). On 5th May 1766, Mr Fowell applied to the Leyton Vestry for leave to enclose a piece of ground : he was instructed to stake it out for inspection. On 9th June the Vestry considered and voted—6 for, 9 against. It, moreover, applied to the Lord of the Manor not to make any further grants of waste land “ as the poor are already deteriorated by them.” On 29th September it was reported that Mr Fowell had begun to build a wall round the land, and the Parish Beadle was instructed to inform him that unless it were immediately pulled down, the vestry would do so. However, the Parish Beadle was apparently ineffective—maybe he was not unbribable—for on 1st December notice was taken that the land had been enclosed, the vestry still being determined to remove the wall. A week later Mr Fowell appeared at the meeting : he no doubt gave excellent reasons why the wall should stand, and, as proof of his charity and goodwill, offered £100 for the poor of the parish. This offer was, of course, accepted, and so more public land was lost and Mr Fowell’s heirs enriched for ever. In this true story are heaps of morals and only two unusual features : the first is that the parish meetings were not always consulted ; the second that the sops to the conscience were usually nearer £5 than £100.

Previous to 1760, enclosures were only permitted by Act of Parliament and hundreds were passed (22). After that, anarchy reigned, and by the end of the century the 60,000 acres of Charles I's Forest were 12,000 only. But it was in this period too that one of the earliest natural history records appeared: for in 1771 Richard Warner completed his great "*Plantae Woodfordiensis*."

The Forest Courts were still functioning sporadically and half-heartedly and the Forest itself was being exploited to the utmost. A report of 1813 mentions gravel and sand-pits everywhere, with the turf stripped from whole acres of ground. Encroachments were continuous, timber destroyed, and deer-stealers abundant. (It was not for nothing that nearly every cottage in the Forest had a movable hearthstone.) The Court of Attachments virtually surrendered by declaring that it would not interfere with encroachments by public roads or where deer did not feed. The fact was that the laws were now obsolete, being framed for ministering to a King's pleasure no longer exercised.

The Crown was by this time represented by the Commissioners of Woods and Forests. In 1817 they made their first official attempt to convert Epping Forest to a patch of normal countryside. Their proposal was to extinguish the rights of common, remove the deer, uproot the trees and divide the land between Crown and Commoners. In spite of local opposition, a bill passed the Commons but petered out. No other official interest was shown for over thirty years, though it needed no interference from outside to destroy the rights of centuries: for the very man appointed to guard the Forest rights, the Lord Warden, ignored, destroyed and sold them. In 1831 he openly supported enclosures, and later sat on the Court of Attachments himself, claiming to be sole judge. A few officials tried to do their duty, but as one Keeper said, "Finding nothing done we gave it up in despair." The last of the Forest Courts was held in 1854 after an existence of at least seven hundred years (8).

Meanwhile Parliament had shown its interest again; it appointed a commission, and what is rare (and unfortunate in this case) acted on its recommendations immediately. This commission of 1849 made the amazing suggestion that the Crown should recoup itself for losses caused by unlawful enclosures, by making further enclosures of its own; that the deer should be removed and the land disafforested. An act was promptly passed for the disafforestation of Hainault Forest. 2000 acres containing 100,000 oaks and hornbeams were allotted to the Crown and the entire area was cleared of trees in six weeks by steam ploughs and drags. A few years later the Commissioners were able to announce proudly that the former precarious yearly income of £500 from timber-cutting had been succeeded by a farm rent-roll of £4000 (8). Philistinism had triumphed again and something beautiful had gone for ever. The popular view of Epping Forest in the late 18th and early 19th centuries may be well illustrated by quotations from Young's "*Agriculture of Essex*": "the . . . forests of Epping and Hainault are viewed as an intolerable nuisance . . . These forests . . . are well known to be the nursery and resort of the most idle and profligate of men . . . At pre-

sent they remain in a state of nature and are productive of no one good . . . As to enclosure . . . all must wish for such an event who are witnesses to the evils arising from its present state of barbarism " (23).

That this spirit was hard in dying is shown by the fact that the Crown disposed of their rights in 16,000 acres between 1856-63 at £5 per acre, encouraging and even bullying the lords of forest manors to buy them. In 1863, however, came a significant change when the House of Commons recommended that no Crown land within 15 miles of London should be sold or enclosed.

In Loughton the Lord of the Manor was the Rector, and in the 1300 acres he had fenced were trees used for lopping. An old man of seventy, Thomas Willingale, determined to lop where, by ancient rights, he had always lopped. In 1866 he, his son and two nephews struck the blow for justice, and the younger men were imprisoned (24). The Commons Preservation Society noted and acted, summoning in their turn the Lord of the Manor. The case hung on for several years, was never decided but gave valuable time during which further encroachments were prevented.

Nevertheless, the encroachers were strong and wealthy. A motion in Parliament suggested in 1870 that the forest be made over to the various landowners with 600 acres for public use. So black was the outlook that the proposal was nearly accepted. The Corporation of London, using as the key to their case, their rights as owners of 200 acres to pasture pigs on the Forest Wastes, took proceedings against the lords of sixteen manors to prevent enclosures. The suit began in 1871, and ended in 1874 with a decision that enclosures were illegal. Yet even then it was undecided what to do with them: the commissioners recommended easy terms for those who had bought forest land. As answer to this, a party of commoners began to pull down the fences.

Of the 6000 acres of forest land, half were enclosed (17). The deer were in a sad state. The last of the red deer had been removed to Windsor Forest in the 'twenties, but there were over 200 fallow in 1849. By 1855 the number had fallen to 86, in 1858 to 48, and in 1870 to 12, which included only one buck (8).

The final settlement came in 1878 when the Epping Forest Act was passed. The Crown rights, the Forest courts, officers, laws and customs were ended and the Corporation of London were appointed conservators. Queen Elizabeth's Lodge and the deer were transferred to them, and illegally-enclosed lands ordered to be thrown open. (Over 400 owners were dispossessed by this.) The owners of lopping rights, fuel-assignments and gravel-digging rights had to be compensated. The central duty of the Corporation was to keep the Forest unbuilt upon, to protect and manage it as an open space for the recreation and enjoyment of the public, to preserve its natural aspect, ancient remains, timber and underwood (9). And so 5530 acres of woodland were formerly dedicated to public pleasure on 6th May 1882, when Queen Victoria drove through to High Beach.

Though forest histories usually end at this point, what has happened since is far too important to ignore. The Corporation's policy at the

outset was very much that of providing a public playground; bye-laws put an end to the old gypsies, beggars, vagabonds and bird-catchers, and William Morris (25) lamented the retreats and steam roundabouts, saying that in his boyhood days the only foes of the forest were the gravel-stealer and fence-maker. Later in 1882 Wanstead Park was added to the forest; Oak Hill, Theydon, provided another twelve acres in 1889, and two years later, Highams Park was acquired. In 1899 Yardley Hill was added with its superb views over the Lea Valley, and the old Fairmead Lodge was demolished, its grounds being thrown into the forest. There were fears in those years that landscape-gardening was being attempted, and considerable protest at the practice of shooting deer by City gentlemen to keep their numbers down. The fallow-deer have maintained their numbers at about 120 in recent years, but the position of the roe-deer is very obscure. A few were released by Mr E. N. Buxton in 1884 and multiplied, but their successors have proved elusive, none having been seen since 1917 (26).

Vast hordes of people visited Epping Forest at Holiday-times at the end of the nineteenth century, and Chingford Station alone used to handle 37,000 trippers on Bank Holidays (27). In 1897 it was reported that the primrose, foxglove and Solomon's Seal were fast disappearing.

The years prior to the 1914-1918 war brought little change if we except the partial reafforestation of Hainault Forest in 1903 and an attempted revival of charcoal-burning in the Cuckoo Pits in 1908-9 (28). (Though this had been illegal under the old forest-laws, records of prosecutions exist and an old coal-hearth has been reported in Lord's Bushes) (29).

After the war came the popularisation of motoring and the spawning of pink villadom, the ugly tide of brick creeping up and clustering round Chingford and Woodford and Loughton. Two things have prevented further spoilation; the first is the River Lea, which thanks to its previous lack of road-crossings, was an effective divide between the Forest and London. The second is the L.N.E.R. whose intensive suburban service was mainly limited to ten miles from Liverpool Street, and which leaves many forest areas quite untouched. But the coming electrification to Ongar, and the vast housing plans impending, nullify both these safeguards. And unless there are forthcoming additions to the Forest far larger than Knighton Wood, 40 acres of which became public forest in 1930, what remains comparatively remote and unspoiled will, all too soon, be but a memory.

Epping Forest, with its twiggy slopes of hornbeam, the spring sun on the beech-boles, the antlers among the bracken, its whispering groups of tits, and badgers sniffing the night-air, is a jewel of unpriceable worth and deserves a worthy setting. All who love it must be grateful for the liberty that is theirs, to wander freely in this old hunting ground of kings, their favourite of all the seventy Royal Forests in England: but they must never forget that the price of that liberty is unceasing vigilance.

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The Climate of Epping Forest.

Detailed observations of the rainfall and minimum night temperatures have been taken in Chingford, by Miss M. L. Mathieson, over a period of about 40 years. It is thought that a summary of these observations will be of interest and value, particularly in connection with the survey. The following tables and particulars have been computed from the original records, and the Branch Council wish to express their gratitude to Miss Mathieson for making her note-books available to them.

(a) *Rainfall.*

The annual totals of rainfall show a wide variation (14.0 to 32.4 inches), and consequently a complete set of totals is given in Table 1.

TABLE 1.—ANNUAL TOTALS OF RAINFALL.

Year.	Inches.	Year.	Inches.	Year.	Inches.	Year.	Inches.
1905	22.0	1915	30.4	1925	24.0	1935	25.8
1906	23.4	1916	30.1	1926	27.7	1936	25.1
1907	23.3	1917	24.4	1927	30.7	1937	30.7
1908	24.0	1918	27.6	1928	25.5	1938	22.1
1909	26.6	1919	24.3	1929	22.8	1939	32.4
1910	25.2	1920	22.9	1930	26.8	1940	25.6
1911	24.3	1921	14.0	1931	24.5	1941	26.1
1912	25.7	1922	22.8	1932	21.3	1942	23.1
1913	21.9	1923	23.9	1933	18.7	1943	20.4
1914	25.4	1924	30.9	1934	20.0		

Annual Average, 1905-1941 = 24.92 inches.

Average for first six months of each year = 10.92 inches.

Average for second six months of each year = 14.00 inches.

The average monthly rainfall over the period 1905-41 is shown in Table 2.

TABLE 2.—MONTHLY AVERAGES.

Month.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	Inches.											
	2.18	1.60	1.67	1.89	1.72	1.84	2.43	2.22	2.00	2.35	2.54	2.44

These figures do not agree with those published* for various parts of Essex for the earlier period 1881-1915. However, they are in reasonable agreement with the figures for the 112-year period, 1815-1926, taken at Greenwich; see Table 3.

TABLE 3.—COMPARISON OF RAINFALL.

Period.	Chingford,	Greenwich,
	1905-43.	1815-1926.
January-March	5.45	4.98
April-June	5.45	5.50
July-September	6.65	6.91
October-December	7.33	6.96

Of course, the Greenwich figures are not strictly comparable, and the evidence suggests that 35 or 40 years is not a sufficiently long period to give stability in rainfall statistics.

The highest monthly rainfall over the 39-year period was 6.27 inches in November 1940. The wettest month of each year fell 9 times in the first half of the year, and 30 times in the second half; it fell only 4 times in the five months February to June.

The actual rainfall in 1942 and 1943 is given in Table 4.

*The records used for comparison are conveniently summarized in the Land Utilization Survey Reports, Nos. 79 (Middlesex and London) and 82 (Essex).

TABLE 4.—RAINFALL IN 1942 AND 1943.

Month.	Inches.		Raindays.	
	1942	1943	1942	1943
January	2.06	4.69	15	24
February	1.11	1.29	8	8
March	2.30	0.40	13	6
April	1.14	1.21	8	9
May	2.37	1.53	14	9
June	0.25	1.60	5	10
July	1.49	1.32	9	11
August	2.35	1.49	15	13
September	1.49	1.75	13	13
October	3.87	2.19	16	13
November	2.27	1.57	13	16
December	2.39	1.37	20	9
Totals	23.1	20.4	149	141

(b) *Minimum Night Temperatures.*

The records of minimum night temperatures show a considerable constancy from year to year in the average figures of each month. Consequently only the 1943 observations will be given; these are shown in Table 5, all in degrees Fahrenheit.

TABLE 5.—MINIMUM NIGHT TEMPERATURES, 1943.

Month.	Average.	Lowest.	Highest.
January	34.6	21	45
February	33.4	20	45
March	32.9	23	46
April	41.0	30	51
May	43.2	33	58
June	48.7	42	57
July	52.0	40	59
August	50.9	37	61
September	45.5	27	59
October	43.4	29	56
November	34.6	24	52
December	31.7	21	44
Year	41.0	—	—

The averages given agree very well with the published figures for various parts of Essex over a 30-year period. The average maximum day temperatures are about 10° F. above the average minimums for the winter months, and about 20° F. above for the summer months.

The number of frosts occurring may be of significance, and is accordingly recorded in Table 6. The averages are for the ten years 1934-1943.

TABLE 6.—NUMBER OF FROSTS.

Month.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Average No.	15.0	13.4	13.2	6.3	2.2	0	0	0	0.1	2.1	7.5	11.4	71.2
No. in 1943	11	11	17	1	0	0	0	0	1	1	11	17	70

(c) *Hours of Sunshine.*

For completeness, it may be added that the total number of hours of bright sunshine averages about 1500 per year, or about 4 per day. Over two-thirds of the total is recorded for the six months April to September. No local records are available, but these figures are based on those for Enfield, only a few miles away.

D. G. T.

Obituary.

Alice Hibbert-Ware, 1869-1944.

MISS HIBBERT-WARE joined the London Natural History Society in 1926, but she had been familiar with Epping Forest and the surrounding district for nearly twenty years. She was a distinguished all-round naturalist and possessed a rare gift for teaching and passing on her enthusiasm to others. Having been a much valued member on the staff of two large girls' schools, she came in 1911 to live at Leytonstone, and later at the White Cottage, Gillwell Lane, Chingford. She joined the Essex Field Club, the British Mycological Society, the Linnean Society, and for twenty years was on the Council of the School Nature Study Union. Her articles in *School Nature Study*, based on her own thoughtful observations, are stimulating to students of all ages. When she moved to Chingford she made her home a centre for Nature Study and hospitality. From 1931 she shared her brother's home at Girton near Cambridge, and threw herself into all the beneficent activities of the village life. She became a manager of the village school and kindled the love of natural history in the children. For years she had been interested in the food of wild birds, and made a special study of their "pellets" or food castings. She undertook to act as analyst for the Little Owl Food Inquiry organized by the British Trust for Ornithology, and drew up a masterly Report (1936-37) which brought her well-earned appreciation from ornithologists all over the country. Only those who have studied the Report realize the amount of careful investigation the analysis entailed. The result of its publication was that the Ministry of Agriculture at once accepted the Report and acted on it, sending a memorandum to every local authority by the Home Office that the Little Owl is to be ranked with other Owls as a very useful bird. By the death of Miss Hibbert-Ware a very beautiful and inspiring personality has passed away.

G. LISTER.

Louis Beethoven Prout, 1864-1943.

LOUIS B. PROUT died on the last day of 1943 at the age of 79. His death was the last in the long series of losses sustained by Entomology during that year, but it was certainly not the least grievous one. Indeed, it may be doubted whether the position which he held in

Entomological Science will not be the hardest of all to fill, for he was the acknowledged world-authority on the great super-family of moths, the *Geometridae*. So great was his reputation in this field that hardly any work of international importance dealing with the Lepidoptera could be projected without an effort to induce him to undertake the editorship of the part relating to the *Geometridae*. Thus we find him responsible for the relevant sections of the *Catalogus Insectorum*, of Wytsmann's *Genera Insectorum*, as well as of Seitz's *Macrolepidoptera of the World*. He was engaged on a supplement to the last-named work at the time of his death.

Some of us can still recall the days when Prout was an active collector in the field. More than once has the writer seen him passing through the City at the rush-hour, with a Bignell beating-tray tucked under his arm, and a bulky satchel slung over his shoulder—en route for happy hunting-grounds in Surrey or Kent. In those days, too, he bred Lepidoptera on a considerable scale, largely for the purpose of obtaining data of interest from a Mendelian point of view. Imperceptibly, however, his interests became more specialised, his field operations more infrequent; and he gradually developed into the authority on taxonomy and literature that we knew in latter years. He was long ago elected a Special Life Fellow of the Royal Entomological Society of London.

Prout was associated with both of the Societies which later became merged into the London N.H.S. He held in turn most of the offices in the North London Society, and was the first President after the amalgamation in 1914. He was an Hon. Vice-President up to the end. A glance over the records reminds us that in the period up to 1902 he led several field excursions, and that he gave numerous papers and addresses—largely on the Geometers—down to 1916. Of recent years he was not often seen at our meetings; but, to the surprise and delight of his friends, he was present and spoke at the Bacot Memorial meeting in April 1943. That was his last attendance at any meeting of the Society.

Of his activities apart from Entomology the writer is not competent to speak. It is, however, common knowledge that Louis Prout came of a noted artistic and musical family, and was himself for some years professor on the staff of the Guildhall School of Music. Samuel Prout, the well-known water-colourist, was his great uncle; and his father, Ebenezer Prout, was a distinguished musician. It seems but yesterday that the writer saw the unmistakable figure of Ebenezer Prout emerge from the train at Liverpool Street, amid the crowds of office workers—all girt about with the most rigid Victorian conventionality. But there was no such conventionality to be detected about Ebenezer Prout, as he marched along puffing away at his pipe—any more than there was about Louis who, like his father, was a talented musician, but, unlike him, was a non-smoker. Of Louis the dominant memory left to his acquaintances will be that of a gentle and kindly friend, a person of equable temper and rare patience, a man devoid of vanity or self-seeking, ever ready to afford advice or help in a wholly self-less manner. While, therefore, we acclaim in him the genius of the scientist, and admire the talent of

the musician, we are left wondering whether pride of place should not rather be accorded to our love and reverence for a character such as we are hardly likely to meet with again.

J. A. S.

Adam Charles Smith, 1871-1943.

A. C. SMITH was born at Elie on the coast of Fife on the 21st November 1871—the third son of Capt. Adam Smith, of the good ship *McCallummore*. The family moved to London in the early eighties, settling in Clapton, and Smith was sent to the Grocers' Company's School. It was there that he met the writers and other boys with whom he maintained a life-long friendship, founded in the first instance on a common interest in entomology; and it was at his house (Ivy House, Goulton Road, Clapton) that the Clapton Naturalists Field Club was formed—the small society out of which eventually grew the North London Natural History Society.

Leaving school in 1887, he entered a City office where his work left him little time or energy for his old interests. He left that post in 1889 to accompany his father on a long voyage, in the course of which he visited Australia and South America. A protracted stay at a Chilean port gave opportunities for extended journeys into the Andes; and those weeks among the Latin Americans formed one of the high lights of his memories. In the early nineties he and his father (who had by that time retired from his sea calling) started a small business as makers of sails and tarpaulins. Scottish grit and perseverance soon placed its future beyond doubt; and some years later it became the principal constituent in the important firm now known as Adam & Lane & Neeve Ltd. Smith remained the driving force of the combination until ill-health enforced his withdrawal.

In 1914 he joined one of the writers in a journey to Albarraccin in the Sierras of the Spanish province of Aragon. Within a day or two the old interest in entomology revived and he collected butterflies with the greatest assiduity. The interest remained after his return, and he soon became an ardent entomologist, acquiring cabinets, apparatus and books, and eventually becoming a fellow of the Royal Entomological Society. There followed many journeys to Continental localities—Switzerland, the Riviera, La Ste Baume, Villars Cotterets, Angoulême, the Pyrenees, and the Italian Tyrol—and his activities were only terminated by ill health. The first onset of these troubles was in 1934, and when it was hoped that the initial causes had been overcome, glaucoma supervened, and left him little useful vision. All his former interests were extinguished; and life became a burden. He died on the 24th August 1943.

Smith was not a member of this Society at the time of his death; but nevertheless his memory must be accorded an honoured place in our archives—the honour that we owe to one of the founders of that modest club which eventually developed into the major constituent of the Lon-

don Natural History Society. As an entomologist he concerned himself entirely with the practical side, and so far as is known, made no contribution to scientific literature.

J. A. S. and C. B. S.

Harry Forbes Witherby, 1873-1943.

THE death of H. F. Witherby deprives not only the London Natural History Society, but the whole company of British ornithologists of a leader who had more right than any other of them to be called the doyen of British ornithology. This is not the place to describe Witherby's career and contributions to our knowledge of birds, for that has been adequately done in excellent memoirs in the *Ibis* and his own journal, *British Birds*. So long as *British Birds* continues to be the periodical and *The Handbook of British Birds* the permanent Bible of British ornithologists, so long and longer will the name of H. F. Witherby be revered and honoured among their company. Witherby had been a member of the London Natural History Society since 1929, and many members of the Ornithological Section will treasure their memories of a visit paid to his home, Gracious Pond Farm, near Chobham, Surrey, in May 1935, when he kindly entertained a large party to tea. When he first joined the Society, Witherby was living at Hampstead, and was keenly interested in the birds of the Heath and Ken Wood. He was always most appreciative of any help the Recorders of the Ornithological Section were able to render him on points of distribution in the London area in connection with "The Handbook."

R. S. R. F.

Absent Friends.

The following members serving in the Forces overseas or in prisoner of war camps would be very glad to receive letters from other members.

- F/Lt. G. Beven, c/o P.O. Box 1573, Durban, S.A.
- Sgt. E. M. Cawkell, A.E.C., 254206, Army Educ. Bch., G.H.Q., M.E.F.
- Capt. E. H. Gillham, R.A.S.C., 4 Armd. Bde. Coy., R.A.S.C., C.M.F.
- K. M. Guichard, N.A.E.B., A.F.H.Q., B.N.A.F.
- Lt. R. C. Homes, R.H.Q., 9 Fd. Regt., R.A., S.E. Asia.
- Pte. David Morgan, 7740, Stalag XXI.D/13, Germany.
- Capt. C. A. Norris, Grassholme, Stratford-on-Avon, Warwickshire.
- Sgt. P. W. Ratcliff, Stalag VIII.B, Germany.
- Gunner C. A. White, 359/138 Fd. Regt., R.A., C.M.F.
- Sub.-Lt. J. S. Wightman, R.N.V.R., H.M.S. *Centurion*, c/o G.P.O., London.

Contributions to a fund for sending books and other comforts through the British Prisoners of War Books and Games Fund to three members of the Society who are prisoners of war will be welcomed by the Secretary of the Fund, Mr R. W. Hale, 6 Grendon Gardens, Wembley Park, Middlesex. It costs a minimum of 5s per month per prisoner to keep the fund going.

Nature Reserves.

THE Nature Reserves Investigation Sub-Committee of the Society, in conjunction with the Chingford Branch, carried out a preliminary survey of existing and proposed nature reserves in the London area during 1943. A special interim report was prepared for Professor Abercrombie, at his request, in connection with the Greater London Plan. During 1944 the full report for presentation to the Nature Reserves Investigation Committee of the Conference on Nature Preservation in Post-War Reconstruction will be prepared. The personnel of the Sub-Committee has continued to consist of Messrs L. J. Tremayne (Chairman), S. Austin, C. P. Castell and R. S. Fitter, but Mr Castell has replaced Mr Fitter as Secretary. The Chingford Branch has been represented at the Sub-Committee's meetings either by Dr D. G. Tucker or by Mr C. S. Bayes. The Sub-Committee and the Chingford Branch (in respect of Essex) appeal to members of the Society to send in any suggestions they may have for areas near London needing preservation to Mr C. P. Castell, 52 Graham Road, S.W.19.

Sectional Secretaries, 1943.

- Archaeology:** Mrs W. C. Cocksedge, 6 Aldersmead Road., Beckenham, Kent.
- Botany:** G. R. A. Short, 36 Parkside Drive, Edgware, Middx.
- Ecology:** C. P. Castell, B.Sc., 52 Graham Road, S.W.19.
- Entomology:** R. M. Payne, 22 Marksbury Ave., Richmond, Surrey.
- Geology:** A. S. Garrido; C. P. Castell, B.Sc.
- Ornithology:** R. S. R. Fitter, F.Z.S., M.B.O.U., 39 South Grove House, N.6.
- Plant Galls:** H. J. Burkill, M.A., F.R.G.S., 3 Newman's Court, Cornhill, E.C.3.
- Ramblers:** Miss L. J. Johns, 87 Morley Hill, Enfield, Middx.

List of Members.

Owing to pressure on space, the Publications Committee has decided not to publish the List of Members this year. It will appear again in the *London Naturalist* for 1944.

Official Reports for 1943.

Council's Report, 1943.

PROGRESS during 1943 has been maintained; the number of Indoor Meetings was the same as during 1942, but the Field Meetings increased, and attendances have also shown improvement. The number on our books is now 541, a slight increase of 5 on that of 1942. A gratifying feature is the flow that has begun from the war-time Register back to full Membership, thus indicating a promise of greater activity and improved finance.

The London Naturalist with its supplement the *London Bird Report* were issued rather late again in the year, and in their attenuated "austerity" form, but what they lost in volume they made up in quality, which was as high as ever. The Finances of the Society remain surprisingly good considering the lean times through which we are all passing.

The Chingford Branch continues its excellent work, and is growing both in numbers and scientific achievements; it is taking active part in the national scheme for Preservation of Nature Reserves, to help foster which a Committee of the main Society has been established.

Research work is still vigorously prosecuted, and for its furtherance, as well as for the general welfare of the Society, the Council would urge every member to recruit as many new members as possible.

A. B. HORNBLOWER, *Hon. General Secretary.*

Librarian's Report, 1943.

DURING the past year over 100 new books and more than 50 new periodicals have been added to the Library. About 80 books were taken out after meetings and another 80 publications and books have been sent out by post. Mr Payne has seen to the repair of cupboards, and Mr Hindson has continued his useful work of bundling old periodicals in a vain effort to find more shelf room. His new card index has been of great service. It is the first step towards a new catalogue, but until more cupboards are available our books cannot be adequately shelved or catalogued.

Our largest acquisition was a gift of 62 books on Archaeology and 15 books on other subjects from the library of a former member (the late H. Marshman Wattson). It has not been possible to put these books in their appropriate sections, but they have been listed and are available. Increasing use is being made of the 70 odd publications which we receive annually from kindred Societies and as soon as another cupboard is procured it is proposed to keep the current numbers of these where they can be readily consulted instead of filing them away.

A small Library Committee has worked hard and pushed through its demand for the following useful additions to the Library:—A. D. Imms, *Textbook of Entomology*; A. G. Tansley, *The British Isles and their Vegetation*; C. Elton, *Animal Ecology*. Other notable additions made whilst Mr Hindson has been working on the Library are Fowler's *Coleoptera* (5 vols.) and N. H. Joy's *Practical Handbook of British Beetles*.

I should like to thank Mr Spinney, Mr Hindson, Mr Castell, Mr Burkhill, and other stalwarts who have kept the Library going during a most difficult period.

In future the Library will be open on the first Tuesday of each month as well as after meetings, so during the coming year it may be possible to make some much-needed improvements in the Library service.

T. L. BARTLETT, *Hon. Librarian.*

Curator's Report, 1943.

I HAVE pleasure in recording that the Society's Collections are in good order and preservation. I have received only very brief reports from Sectional Curators this year, as the increasing stress of war conditions gives little time for curating activities. Mr Pinniger states that some work has been done on the Lepidoptera and that a Collection of Odonata is in process of formation. He asks for a volunteer for the Coleoptera.

Mr Burkhill in a letter reports the satisfactory condition of the Plant Gall Collection, and Mrs Parrinder and others have been through the Ornithological cupboards during the year. Perhaps our most active collaborator is still the Rev. P. H. Cooke with the Herbarium. He has the time to give to his honorary office and he gives freely, and the Society will, I know, continue to appreciate his active interest.

Members have had little opportunity during the year to avail themselves of the Collections and some of our new members may scarcely be aware of the Society's property in the Corridor; it, therefore, seems fitting to set out in this Curator's Report that my continued insistence to the Council on the desirability of the Library and Collections being open to members and sub-curators monthly on a non-meeting night has met with final approval and our 1944 syllabus announces the availability of the Corridor on the first Tuesday monthly from 6 p.m. to 9 p.m.

May I conclude by expressing the hope that this facility will be well supported by all concerned.

L. G. PAYNE, *Curator.*

Report of the Director of Sectional Organisation, 1943.

THE fourth year of the war finds the Society alive and active, as indicated by the work done and in hand by the various Sections, despite a further decline in its specialist members.

The Surveys initiated at Bookham Common, and more recently in Epping Forest at Chingford, have offered opportunity to members of all Sections—the **Ecologists** in particular having done much interesting work at both places, the Chingford site having recently been mapped.

Entomologists and **Botanists** have been stimulated by the opportunity offered for co-operative work and species new to our district have been added to our records.

A number of our keenest **Ornithologists** are on active service, but the Section held many field meetings, arranged lectures, and produced the *London Bird Report* for the 7th year.

Plant Gall recording continues, and the **Ramblers** Section held some outdoor meetings. Unfortunately, the **Archaeologists** have not recovered their old status and this Section must be regarded as temporarily suspended, but they can with pleasure record a valuable addition to their section of our Library, by the gift from the estate of an old and valued member of the Section, the late R. Marshman Wattson, of 64 volumes dealing with their subject.

Geology has never been strongly represented in the Society, and the Committee in charge of this Department is marking time till a favourable opportunity offers for advancement.

The Sections are in close touch with the *Nature Reserves Sub-Committee*, recently appointed under the auspices of the Nature Reserves Investigation Committee and the Ministry of Town and Country Planning. It is hoped by this means valuable help will be obtained in furtherance of the work of the Sub-Committee.

S. AUSTIN, *Director of Sectional Organisation.*

Report of the Chingford Branch, 1943.

THE year has seen a considerable development in the activities of the Chingford Branch. A total of 28 meetings has been held; at the 8 indoor meetings the average attendance has been 29, as compared with 20 last year. At the 20 field meetings, the average attendance has been 12, as last year, but it is to be noted that a much larger number of field meetings has been held. The Council of the Branch has met 4 times.

Work on the ecological survey at the Cuckoo Pits has progressed, and a preliminary report, together with a map, has appeared in *The London Naturalist*; but there is still a lack of really serious workers.

Recruitment of new members and associates has been satisfactory, 3 full members and 12 branch associates having been enrolled through the Branch.

Co-operation in the Nature Reserves Investigation has been promised, and the Branch has undertaken to prepare the report for the Essex portion of the Society's area. Mr C. S. Bayes, who is taking charge of this work for the Branch, has already made considerable progress in the collection and collation of information, and a certain amount of field work has been done by members.

The Branch Council feels that the year's working has been satisfactory.

D. G. TUCKER, *Branch Secretary.*

Papers Read to the Society in 1943.

The Black Rat in London—James Fisher, M.A., F.Z.S., M.B.O.U., January 16.

British Ferns—L. G. Payne, F.Z.S., February 20.

The Progress of the Woodpigeon Investigation—R. S. Fitter, F.Z.S., M.B.O.U. (in the absence of M. K. Colquhoun), March 20.

Bacot Memorial. An Entomological Gossip, mainly about Butterflies—J. A. Simes, O.B.E., F.R.E.S., April 17.

St James's Park—T. L. Bartlett, B.A., May 18.

Some Visual Aspects of Bird Watching—G. W. Robertson, Ph.D., June 15.

Ornithological Notes: July 20.

The Birds of the Cuckoo Pits Area of Epping Forest—K. E. Hoy. Field Observations on the Iceland and Glaucous Gulls—T. Bispham, B.Sc., A.I.C.

The Black Redstart in London in 1943—R. S. R. Fitter, F.Z.S., M.B.O.U.

Historical Sketch of Epping Forest—C. S. Bayes, September 21.

Notes on the Birds of the Tay Estuary—G. Carmichael Low, M.D., F.Z.S., M.B.O.U., October 16.

The Food We Eat—G. R. A. Short, November 20.

Presidential Address: The Good Earth—J. B. Foster, B.A., December 18.

Natural History Brains Trust: Question-Master. R. S. R. Fitter, F.Z.S., M.B.O.U., December 18.

STATEMENT OF ACCOUNTS 1943: GENERAL ACCOUNT.

Balance, 1st November 1942	...	£78 1 2	Rent	...	...	...	...	...	...	£18 2 3
Interest on Post Office Account	...	...	Syllabus Expenses (Printing and Postages)	...	...	...	...	...	...	38 19 2
Interest on £75 War Stock	...	...	General Printing and Stationery	...	...	...	...	...	...	9 11 10
Subscriptions and Entrance Fees	...	...	Postage (Secretary and Treasurer)	...	...	...	...	...	...	9 7 11
Donations	...	...	Insurance	...	...	...	...	...	...	2 16 10
			War Damage Insurance	...	...	...	...	...	...	5 0 0
			Gratuities	...	...	...	...	...	...	2 0 0
			Subscriptions	...	...	...	...	...	...	2 13 6
			Sectional Expenses	...	...	...	...	...	...	6 5 2
			Reading Circle Grant	...	...	...	...	...	...	1 1 8
			Secretary's Honorary	...	...	...	...	...	...	45 0 0
			Chingford Branch Expenses	...	...	...	...	...	...	6 2 3
			Transfer to London Naturalist Account	...	...	...	...	...	...	68 9 4
										£2215 9 11
										ACCOUNTS.
			Balance	...	...	...	...	...	...	73 19 11
										£289 9 10

LONDON NATURALIST ACCOUNT.

Donations	..	..	...	...	...	£3 2 6	Printing and Postage of London Naturalist	...	...	£82 17 5
Advertisement	..	..	..	..	..	1 0 0				
Sales of London Naturalist and London Bird Report	..	..	..	..	..
Reprints and Maps	..	..	..	..	..	7 10 2				
Transfer from General Account	..	..	..	..	..	2 15 5				
						68 9 4				
										£82 17 5

BOTANICAL RECORDS ACCOUNT.

Donation	On deposit in the Post Office Savings Bank.	
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The balance on the Life Composition Account remains at £165, and the balance of the Reserve Account remains at £175. The balances are invested in 3½% War Stock or are on deposit in the Post Office Savings Bank.

Audited and found correct, 26/11/43.

S. AUSTIN,
J. H. G. PETERKEN, Auditors.

F. G. DELLY, Treasurer.

Book Review.

A Year with Nature, by J. E. Roberts. Edward Arnold & Co.; 236 pp. 236 + viii, 136 figs. and frontis. 3s 6d.

COMMENCING with the animals and plants of autumn and winter, spring and summer complete the review of the countryside year. Throughout the book the wealth of practical hints on observing wild creatures and their habits and the abundant suggestions for study show the author's interest in the newcomer's approach to natural history. Our member's great experience as a field naturalist and school teacher is evident. The appendix, with its discussion of the activities of a naturalist, nature clubs, museums, books, keeping pets, and nature calendar, etc., introduces the student to further studies available as his knowledge increases. The photographs are excellent, though in one or two cases reproduced a little too dark. The remaining figures are clearly drawn by N. M. Bell.

There are one or two minor improvements that might be made in the next edition. Firstly, the author's name should be given for the Penguin and Pelican books, especially for a library list. Secondly, it should be explained that a necessary part of the scientific name of each animal and plant is the name of the author or describer. This omission is a common error of many natural history books. With regard to English names for insects, Miss Longfield has provided each dragonfly with one. But these are minor points in an excellently produced book, and our fellow member is to be congratulated.

L. P.

South-Eastern Bird Report for 1942. Edited by Ralph Whitlock, Webb's Farm, Pitton, Salisbury, Wilts. 5s.

THIS useful record of birds seen in Sussex, Surrey, Kent and Hampshire continues to appear in spite of war-time difficulties. Mr Whitlock and the South-Eastern Union of Scientific Societies, under whose auspices the Report is published, are to be commended for carrying on. By arrangement with the L.N.H.S. the parts of Kent and Surrey within our area are excluded, and we send him any records we may receive for Kent and Surrey outside our area. Members are urged to send such records direct to Mr Whitlock. The Hampshire Section of the *South-Eastern Bird Report* is now a reprint of the annual "Ornithological Report for the County of Hampshire" published by the Hampshire Field Club.

Among the interesting records for 1942 may be mentioned Crossbills and a Waxwing at Haslemere, a Dartford Warbler on Chobham Ridge in November, and a Twite at High Halstow in November.

R. S. R. F.

PRESENTED

22 SEP 1944



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By J. E. ROBERTS, Science Master, King's School, Chester, Official Bird Observer to H.M. Office of Works for Hampton Court and Bushey Park (1932-42).

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A first attempt to give Arachnology something of the unity and status of an individual science that is possessed by Entomology.

Edward Arnold & Co., 41 & 43 Maddox St., London, W.1.

PUBLICATIONS OF THE SOCIETY.

London Naturalist, 1921-25, 1929-31 (1926-28 out of print), each 3s; 1932-35, each 5s; 1936-43, each 3s 6d. **London Bird Report**, 1936-43 (1938 out of print), each 1s 6d. **Transactions of the London Natural History Society**, 1914-20, each 3s. **Transactions of the City of London Entomological and Natural History Society**, 1891-1911, each 2s; 1912-13 (1 vol.), 3s. **N.B.**—Members may obtain any of the above at two-thirds of the published price.

"LONDON NATURALIST" REPRINTS.

- 2, 8, 12, 14, 15, 16, 17.—**Botanical Records of the London Area**, being a List of the Plants Observed within 20 Miles of St Paul's Cathedral, in eight (No. 2 out of print) parts (1927-35), each 6d. 4.—**The Thames as a Bird Migration Route**: President's Address, 1928, by William E. Glegg, F.Z.S., M.B.O.U., 6d. 5.—**Ornithological Records of the London Area**, being a Preliminary List of Birds Observed within 20 Miles of St Paul's Cathedral (1928), 6d. 7.—**The Birds of Middlesex since 1866**: President's Address, 1929, by William E. Glegg, F.Z.S., M.B.O.U., 1s. 9.—**British Gall Mites**, by H. J. Burkill, M.A., F.R.G.S. (1929), 6d. 10.—**Some Diurnal Observations on the Nightjar**, by David Lack (1929), 6d. 13.—**Ornithological Records of the London Area** (1932), 6d. 18.—**An Identification Key to British Grey Geese**, by John Berry (1935), 6d. 19, 20, 21, 22, 23, 25.—**The Survey of Limpsfield Common**: 1 (1937), 6d; 2 (1938) with map, 9d; 3 (1939), 6d; 4 (1940), 3d; 5 (1941), 6d; 6 (1942), 3d. 24.—**Randolph William Robbins, 1871-1941**, 6d. 26.—**The Survey of Bookham Common** (with maps): 1 (1942), 6d. 27.—**The Epping Forest Survey** (with map): 1 (1942), 3d. 28.—**The Starling Roosts of the London Area**, by R. S. R. Fitter (1942), 6d. **Map of the Society's Area**: Showing the 24 sections into which it is divided to facilitate botanical recording, 2d. **Life of A. W. Bacot**, by Prof. M. Greenwood, reprinted from *Journal of Hygiene* (1924), 6d.

LONDON NATURAL HISTORY SOCIETY.

THE Society is an amalgamation of the City of London Entomological and Natural History Society, founded in 1858, and the North London Natural History Society, founded in 1892.

A meeting is held monthly in war-time on Saturday afternoons from September to April and on Tuesday evenings from May to August in the London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1. On Tuesdays the room is open from 6 p.m. to 9 p.m., and meetings begin at 6.30 p.m. punctually and terminate about 8.30 p.m., unless other arrangements are announced. On Saturdays the room is open from about 2 p.m. The Library and Collections are available to members on these occasions, and also on the first Tuesday of each month, from 6 p.m. to 9 p.m.

The CHINGFORD LOCAL BRANCH meets at the Staff Recreation Room, Chingford Laundry, Chingford Green, at 2.45 p.m., on the First Saturday in each month during the winter months.

At these meetings specimens of Natural History interest are exhibited, and papers on various subjects are read and discussed. Visitors may be introduced by members of the Society, and are cordially welcome.

The minimum Annual Subscription for members is 12s 6d; if under 25 years of age the minimum is 7s 6d; for associates, 5s minimum. New members and associates pay an entrance fee of 2s 6d. Subscription renewals, which should be sent to the Treasurer, become due on January 1st. Members elected after October 1st pay no subscriptions for the current calendar year. A Register is kept of Members who cannot participate in the Society's work during the war. They pay 2s 6d a year, and receive the Society's publications, but not the syllabus of current activities.

Each member and associate is entitled to one copy of *The London Naturalist* and *The London Bird Report* free; extra copies may be purchased by members, if supplies are available, at two-thirds of the published price.

The Society looks with confidence for the support of all who are interested in the study of Natural History.

Further information and syllabus may be obtained from the Secretary:—A. B. HORNBLOWER, 91 Queen's Road, Buckhurst Hill, Essex.

N.B.—During war-time the time and frequency of Meetings may be varied at the discretion of the Council, and the current syllabus should be consulted.

